Research methodology for management

Unit - 3

Designing of Questionnaire

A good questionnaire should not be too lengthy. Simple English should be used and the question shouldn't be difficult to answer. A good questionnaire requires sensible language, editing, assessment, and redrafting.

Questionnaire Design Process

1. **State the information required-** This will depend upon the nature of the problem, the purpose of the study and hypothesis framed. The target audience must be concentrated on.
2. **State the kind of interviewing technique-** interviewing method can be telephone, mails, personal interview or electronic interview. Telephonic interview can be computer assisted. Personal interview can be conducted at respondent's place or at mall or shopping place. Mail interview can take the form of mail panel. Electronic interview takes place either through electronic mails or through the internet.
3. **Decide the matter/content of individual questions-** There are two deciding factors for this-
   a. Is the question significant? - Observe contribution of each question. Does the question contribute for the objective of the study?
   b. Is there a need for several questions or a single question? - Several questions are asked in the following cases:
      - When there is a need for cross-checking
      - When the answers are ambiguous
      - When people are hesitant to give correct information.
4. **Overcome the respondents' inability and unwillingness to answer-** The respondents may be unable to answer the questions because of following reasons-
      - The respondent may not be fully informed
      - The respondent may not remember
      - He may be unable to express or articulate

   The respondent may be unwilling to answer due to-

      - There may be sensitive information which may cause embarrassment or harm the respondent's image.
      - The respondent may not be familiar with the genuine purpose
      - The question may appear to be irrelevant to the respondent
      - The respondent will not be willing to reveal traits like aggressiveness (For instance - if he is asked "Do you hit your wife, sister", etc.)

   To overcome the respondent's unwillingness to answer:

   viii. Place the sensitive topics at the end of the questionnaire
   ix. Preface the question with a statement
   x. Use the third person technique (For example - Mark needed a job badly and he used wrong means to get it - Is it right?? Different people will have different opinions depending upon the situation)

xi. Categorize the responses rather than asking a specific response figure (For example - Group for income levels 0-25000, 25000-50000, 50000 and above)

5. **Decide on the structure of the question-** Questions can be of two types:
   . **Structured questions-** These specify the set of response alternatives and the response format. These can be classified into multiple choice questions (having various response categories), dichotomous questions (having only 2 response categories such as "Yes" or "No") and scales (discussed already).
   a. **Unstructured questions-** These are also known as open-ended question. No alternatives are suggested and the respondents are free to answer these questions in any way they like.

6. **Determine the question language/phrasing-** If the questions are poorly worded, then either the respondents will refuse to answer the question or they may give incorrect answers. Thus, the words of the question should be carefully chosen. Ordinary and unambiguous words should be used. Avoid implicit assumptions, generalizations and implicit alternatives. Avoid biased questions. Define the issue in terms of who the questionnaire is being addressed to, what information is required, when is the information required, why the question is being asked, etc.

7. **Properly arrange the questions-** To determine the order of the question, take decisions on aspects like opening questions (simple, interesting questions should be used as opening questions to gain co-operation and confidence of respondents), type of information (Basic information relates to the research issue, classification information relates to social and demographic characteristics, and identification information relates to personal information such as name, address, contact number of respondents), difficult questions (complex, embarrassing, dull and sensitive questions could be difficult), effect on subsequent questions, logical sequence, etc.

8. **Recognize the form and layout of the questionnaire-** This is very essential for self-administered questionnaire. The questions should be numbered and pre-coded. The layout should be such that it appears to be neat and orderly, and not clattered.

9. **Reproduce the questionnaire-** Paper quality should be good. Questionnaire should appear to be professional. The required space for the answers to the question should be sufficient. The font type and size should be appropriate. Vertical response questions should be used, for example:

   Do you use brand X of shampoo ?

   - Yes
   - No

10. **Pre-test the questionnaire-** The questionnaire should be pre-tested on a small number of respondents to identify the likely problems and to eliminate them. Each and every dimension of the questionnaire should be pre-tested. The sample respondents should be similar to the target respondents of the survey.

11. **Finalize the questionnaire-** Check the final draft questionnaire. Ask yourself how much will the information obtained from each question contribute to the study. Make sure that irrelevant questions are not asked. Obtain feedback of the respondents on the questionnaire.

Measurement

Measurement scales in Research Methodology are used to categorize and/or quantify variables.From what has been stated above, we can write that scales of measurement can be

considered in terms of their mathematical properties. The most widely used classification of measurement scales are:

- nominal scale
- ordinal scale
- interval scale and
- ratio scale.
- **Nominal scale:** Nominal scale is simply a system of assigning number symbols to events in order to label them. The usual example of this is the assignment of numbers of basketball players in order to identify them. Such numbers cannot be considered to be associated with an ordered scale for their order is of no consequence; the numbers are just convenient labels for the particular class of events and as such have no quantitative value. Nominal scales provide convenient ways of keeping track of people, objects and events. One cannot do much with the numbers involved. For example, one cannot usefully average the numbers on the back of a group of football players and come up with a meaningful value. Neither can one usefully compare the numbers assigned to one group with the numbers assigned to another. The counting of members in each group is the only possible arithmetic operation when a nominal scale is employed. Accordingly, we are restricted to use mode as the measure of central tendency. There is no generally used measure of dispersion for nominal scales. Chi-square test is the most common test of statistical significance that can be utilized, and for the measures of correlation, the contingency coefficient can be worked out.

  Nominal scale is the least powerful level of measurement. It indicates no order or distance relationship and has no arithmetic origin. A nominal scale simply describes differences between things by assigning them to categories. Nominal data are, thus, counted data. The scale wastes any information that we may have about varying degrees of attitude, skills, understandings, etc. In spite of all this, nominal scales are still very useful and are widely used in surveys and other ex-post-facto research when data are being classified by major sub-groups of the population.

- **Ordinal scale:** The lowest level of the ordered scale that is commonly used is the ordinal scale. The ordinal scale places events in order, but there is no attempt to make the intervals of the scale equal in terms of some rule. Rank orders represent ordinal scales and are frequently used in research relating to qualitative phenomena. A student's rank in his graduation class involves the use of an ordinal scale. One has to be very careful in making statement about scores based on ordinal scales. For instance, if Ram's position in his class is 10 and Mohan's position is 40, it cannot be said that Ram's position is four times as good as that of Mohan. The statement would make no sense at all. Ordinal scales only permit the ranking of items from highest to lowest. Ordinal measures have no absolute values, and the real differences between adjacent ranks may not be equal. All that can be said is that one person is higher or lower on the scale than another, but more precise comparisons cannot be made.

  Thus, the use of an ordinal scale implies a statement of 'greater than' or 'less than' (an equality statement is also acceptable) without our being able to state how much greater or less. The real difference between ranks 1 and 2 may be more or less than the difference between ranks 5 and 6. Since the numbers of this scale have only a rank meaning, the appropriate measure of central tendency is the median. A percentile or quartile measure is used for measuring dispersion. Correlations are restricted to various rank order methods. Measures of statistical significance are restricted to the non-parametric methods.

- **Interval scale:** In the case of interval scale, the intervals are adjusted in terms of some rule that has been established as a basis for making the units equal. The units are equal only in so far as one accepts the assumptions on which the rule is based. Interval scales

can have an arbitrary zero, but it is not possible to determine for them what may be called an absolute zero or the unique origin. The primary limitation of the interval scale is the lack of a true zero; it does not have the capacity to measure the complete absence of a trait or characteristic. The Fahrenheit scale is an example of an interval scale and shows similarities in what one can and cannot do with it. One can say that an increase in temperature from 30° to 40° involves the same increase in temperature as an increase from 60° to 70°, but one cannot say that the temperature of 60° is twice as warm as the temperature of 30° because both numbers are dependent on the fact that the zero on the scale is set arbitrarily at the temperature of the freezing point of water. The ratio of the two temperatures, 30° and 60°, means nothing because zero is an arbitrary point.

Interval scales provide more powerful measurement than ordinal scales for interval scale also incorporates the concept of equality of interval. As such more powerful statistical measures can be used with interval scales. Mean is the appropriate measure of central tendency, while standard deviation is the most widely used measure of dispersion. Product moment correlation techniques are appropriate and the generally used tests for statistical significance are the 't' test and 'F' test.

- **Ratio scale:** Ratio scales have an absolute or true zero of measurement. The term 'absolute zero' is not as precise as it was once believed to be. We can conceive of an absolute zero of length and similarly we can conceive of an absolute zero of time. For example, the zero point on a centimeter scale indicates the complete absence of length or height. But an absolute zero of temperature is theoretically unobtainable and it remains a concept existing only in the scientist's mind. The number of minor traffic-rule violations and the number of incorrect letters in a page of type script represent scores on ratio scales. Both these scales have absolute zeros and as such all minor traffic violations and all typing errors can be assumed to be equal in significance. With ratio scales involved one can make statements like "Jyoti's" typing performance was twice as good as that of "Reetu." The ratio involved does have significance and facilitates a kind of comparison which is not possible in case of an interval scale.

  Ratio scale represents the actual amounts of variables. Measures of physical dimensions such as weight, height, distance, etc. are examples. Generally, all statistical techniques are usable with ratio scales and all manipulations that one can carry out with real numbers can also be carried out with ratio scale values. Multiplication and division can be used with this scale but not with other scales mentioned above. Geometric and harmonic means can be used as measures of central tendency and coefficients of variation may also be calculated.

  Thus, proceeding from the nominal scale (the least precise type of scale) to ratio scale (the most precise), relevant information is obtained increasingly. If the nature of the variables permits, the researcher should use the scale that provides the most precise description. Researchers in physical sciences have the advantage to describe variables in ratio scale form but the behavioural sciences are generally limited to describe variables in interval scale form, a less precise type of measurement.

  ## SCALING METHODS

Once the variables of interest have been identified and defined conceptually, a specific type of scale must be selected. Scaling methods are divided into two main categories, open questions and closed question. Scaling is the process of generating the continuum, a continuous sequence of values, upon which the measured objects are placed. An open question is one in which the respondent does not have to indicate a specific response. Open questions have a tendency to generate lengthy answers. Often, respondents see open questions as an opportunity to respond to a question in detail. The advantage of open questions is that they allow the respondent to provide an answer that is not restricted to

a select view. In addition, open questions can provide some very interesting qualitative findings that may lead to new insights, or possibly help to develop future research ideas (Wilson, 2010). There are two disadvantages associated with open questions. First, too many open questions can make the analysis and interpretation of the findings extremely time-consuming. Second, it can make a comparative analysis of qualitative answers difficult. A closed question is one in which a respondent has to choose from a limited number of potential answers. Usually this is a straightforward yes or no. Other closed questions may require the respondent to choose from multiple response options such as multiple choice questions, Likert scale and Semantic differential scale. From another angel, scale methods could be classified as a rating scales and attitude scales. Table 1 shows some of the commonly scaling methods with a brief description.

Scaling Techniques
- Rating Scales
- Graphic Rating Scales
- Itemized Rating Scales
- Comparative Rating Scales
- Attitude Scales
- Likert Scale
- Semantic Differential
-

1.1. Rating Scales

Raters evaluate a person, object, or other phenomenon at a point along a continuum or in a category. A numerical value is then assigned to this point or category.

1.1.1. Graphic Rating Scales

Raters mark, or indicate in another fashion, how they feel on a graphic scale of some sort. A common graphic scale is the thermometer chart. On the scale of 0 to 100, please indicate how you would grade your knowledge about e-services.

- 100 very best   50 indifferent   0 very wors

Record grade   ---------

1.1.2. Itemized Rating Scales

Raters select one of the limited numbers of categories that are ordered in some fashion. The number of categories is usually between 2 and 11. The itemized scale at the right is a 3-point scale.

How interested would you be to use e-service?

Very interested

Somewhat interested

Not interested

1.1.3. Comparative Rating Scales

Raters judge a person, object, or other phenomenon against some standard or some other person, object, or other phenomenon. The scale can take a variety of forms. One comparative rating scale is the rank-order scale. Please rank the following e-service applications in terms of your usage. Assign 1 to the most usage application, 2 to the next, etc.

___ Ticketing

___ Banking

___ Shopping

.2. Attitude Scales

Any one of the variety of scales that measure an individual's predisposition toward any person, object, or other phenomenon. These scales differ from rating scales in that they are generally more complex, multi-item scales

1.2.1. Likert Scale

Respondent indicates degree of agreement and disagreement with a variety of statements about some attitude, object, person, or event. Usually the scales contain 5 or 7 points. The scales are summed across statements to get the attitude score. Using e-service is a wise idea.

Strongly disagree
Disagree
Neither agree nor disagree
Agree
Strongly agree

1.2.2. Semantic Differential

A semantic differential scale intends to see how strongly the respondent holds an attitude. These scales include a progression from one extreme to another Respondent rates an attitude object on anumber of 5 or 7 point bipolar adjectives or phrases. The selection of adjectives or phrases is based on the object, person, or event.

Please rate e-service on the following dimensions.

Secure:--:--:--:--:--:--:--:--:Not Secure
Easy to use :--:--:--:--:--:--:--:--: Difficult to use

II.   CONCLUSION

This presents the different types of scaling methods adapted from Davis (2005). As mentioned, there are two main types of scaling namely; Rating Scales and Attitude Scales. Researcher need to select one scaling method before development of the survey/ questionnaire.

Guttman Scale Definition

Guttman scale is one of the three unidimensional scales, the other two being – Likert Scale and Thurstone Scale. Guttman scale also called cumulative scaling or scalogram analysis is created with elements that can possibly be ordered in a hierarchical manner. It is representative of the extreme "attitude" of respondents, i.e. extremely positive or negative, about the subject in-hand.

This scale is used by researchers in situations where a unidimensional scale for a continuum of opinions is required. "Uni"-dimensional scale indicates that the answer options have only one measurement parameter, i.e., a range of numbers can be associated with the scale. For instance, "On a scale of 0-10, how satisfied are you with the service of this airline?" – can be indicated with unidimensional answer options.

Guttman scale has a list of statements. It can be inferred that respondents who agree to the statement placed at the end of this list, would have agreed to all the other statements above the last one. Each statement will have a corresponding weight associated with it. The cumulation of the weight according to respondent feedback will help researchers in predicting the number of statements agreeable to the respondents. For example, on a 5 scale Guttman scale, if a respondent scores 3 – it indicates that he/she has agreed to the first 3 statements of the scale if a different respondent scores 5 – it indicates that he/she has agreed to all the statements on this cumulative scale.

The main goal of this scale is to filter those respondents who comply with 100% of the statements mentioned in the scale. But, practically it is highly improbable that respondents

totally comply with a series of statements and thus, scalogram analysis is conducted to evaluate the closest set of statements that the target audience agrees with. Bogardus scale is a populat example of the Guttman scale.

Guttman Scale Characteristics

- **Unidimensional in nature:** Guttman scale has statements in the order of difficulty – from the least difficult to the most difficult and is thus, unidirectional in nature. In a 10-item Guttman scale, if a respondent score 8 – it is indicative of the fact that the respondent agrees with the first 8 statements of the scale and disagrees with the last two statements of the scale.
- **Deterministic model:** The responses are considered according to the last agreed statement of the scale and are cumulative of the responses. The answers to all the statements can be judged on the basis of this cumulative score due to the deterministic nature of this scale.
- **Reproducible questions are added:** Guttman scale only has questions which are reproducible, which means that those questions which will not be able to produce desired results will be eliminated from the scale and only those questions which can boost the purpose of scalability will be included.
- **Ordinal nature of data:** The list of statements is arranged in an ordinal manner, i.e., from the minimum important statement to the maximum important statement.

Steps for developing a Guttman Scale with Examples

To explain the process of developing a Guttman scale in detail, we will be considering an example – After the school shootings across the U.S., should laws be designed for the staff and administration to carry guns to school? It has been a raging topic amongst students after the intensity of the shootings has enhanced over the past few years. There are five main steps in the process of developing a Guttman scale.

- **Clarify the objective of using Guttman scale:** Every scaling method should have a clearly defined objective for effective implementation. In the above-mentioned example, if students wish to calculate a cumulative score of those in support of staff and administration possessing guns in school – this can be their objective for conducting a Guttman scale. In the objective, it needs to be made clear whether all staff members or just some possessing guns will fulfill the purpose.
- **Create a list of statements:** In order to gain desired insights about designing of laws, those in charge can create a list of statements for the scale or involve specialists so that effective statements can be included in the scale.
  1. I support the prohibition of sales of gun bump stocks.
  2. I do not support any regulations on gun sales to the civilian population.
  3. I support the prohibition of gun sales to civilians altogether.
  4. I support stricter background checks during the process of gun sales.
  5. I support prohibiting gun sales to mentally ill people.

Guttman scale statements are often expected to be 80-100 in number for reasonable results.

- **Associate values to each of the statements:** The experts involved in the process of developing the statements should assign values to each of the statements according to their importance to the topic of laws against school shootings. The experts are expected to answer Yes – if the statement is in favor of laws against school shootings and No- if the

statement is not in favor of laws against school shootings. Also, a very critical aspect needs to be addressed at this step – the values assigned should not involve personal opinions of the experts and instead should merely be on the basis of their contribution towards laws for school shootings.

- **Structurize the Guttman scale for analysis:** Analysis of Guttman scale is the most important step. The answers received for various statements can be represented in a <u>Matrix</u>.

Respondent	Statement 1	Statement 2	Statement 3	Statement 4	Statement 5
5	Yes	Yes	Yes	Yes	Yes
10	Yes	Yes	Yes	Yes	–
15	Yes	Yes	Yes	–	–
16	Yes	–	–	Yes	–
20	Yes	Yes	–	–	–
21	–	–	–	–	–

In the above-mentioned <u>matrix</u>, in the first row, if someone agrees to statement 5, it indicates that the individual must have agreed to the preceding statements, i.e. – statement 1 to statement 4.

Also, there can be exceptions in the respondent answers but generally, those respondents who agree to statement 4 would have agreed to the statements 1 to statement 3.

In case there is a restrictive list of statements, it is extremely convenient for marketers to analyze data but when a large <u>data is collected</u>, analysis becomes a tough step. In that case, marketers are expected to analyze a subset that is closest to the desired cumulative.

There are various statistical analysis techniques to analyze collected data to form a closest to ideal Guttman scale. This <u>quantitative data</u> also represents the value of each of the items in the scale.

- **Administer the Scale:** After deciding the various items (statements) of the scale, it is time to administer answers obtained for each of the items. <u>Respondents</u> have to just submit their agreement towards each of the statement.

For the example of laws against school shooting, the order of the statements can be as mentioned below:

1. I do not support any regulations on gun sales to civilian population.
2. I support stricter background checks during the process of gun sales.
3. I support the prohibition of sales of gun bump stocks.
4. I support prohibiting gun sales to mentally ill people.
5. I support prohibition of gun sales to civilians altogether.

Guttman Scale Applications with Examples

Guttman scale is popular in social scaling applications and also while calculating organizational culture, education or achievement evaluation in general.

Application 1: Guttman scale is used to evaluate an organization's hierarchical structure.

By including questions that analyze the employee hierarchy such as:

- I am willing to contribute towards the social causes supported by my organization.
- I am willing to work longer hours to complete the assigned task.
- I am willing to communicate better with my team members.
- I am willing to attend conferences and seminars

Application 2: This cumulative scaling method can also be used to measure a customer journey.

In this case, the below-mentioned questions can be a part of the scale:

- I could easily solve my problem by contacting the customer service team.
- I could get the products delivered to my doorstep.
- I could get in touch with the support team quickly.
- I could look for the required products easily on the company's website.
- I could make the payment for the products easily.

Guttman Scale Advantages

- **Highly hierarchical and structured in nature:** Due to the hierarchical and structured nature of this scale, it can be extremely productive in short surveys and questionnaires. For example, to analyze social distance, employee hierarchy, stages of evolution etc.
- **Implemented to gain insights for multiple queries:** Guttman scale includes multiple statements for the respondents to answer which occupies a short space in an online survey.
- **More intuitive than other uni-dimensional scales:** The way in which the answers are represented in this scale makes Guttman scale extremely intuitive for users.
- **Produces data in a ranked manner:** The statements mentioned in this scale have their degree of importance and values associated accordingly. Thus, the results of this scale are in terms of ranks.
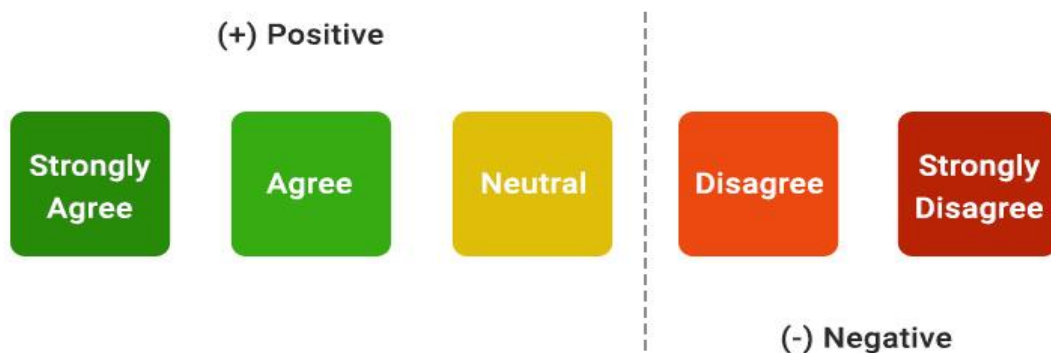
Likert scale

What is a Likert scale?
Definition: A Likert scale is a unidimensional scale that researchers use to collect respondents' attitudes and opinions. Researchers often use this psychometric scale to understand the views and perspectives towards a brand, product, or target market. Different variations of Likert scales are focused directly on measuring people's opinions, such as the Guttman scale, Bogardus scale, and Thurstone scale. Psychologist Rensis Likert established a

distinction between a scale that materializes from a collection of responses to a group of items (maybe 8 or more). Responses are measured in a range of values.

Example of a Likert scale:

For example, to collect product feedback, the researcher uses a <u>Likert Scale question</u> in the form of a dichotomous option question. He/ she frames the question as "The product was a good purchase" with the options listed as agree or disagree. The other way to frame this question is, "Please state your satisfaction level with the products," and the options ranging from very dissatisfied to very satisfied.

When responding to an item on the Likert Scale, the user responds based explicitly on their agreement or disagreement level. These scales allow determining the level of agreement or disagreement of the respondents. Likert scale assumes that the strength and intensity of the experience are linear. Therefore it goes from a complete agreement to a complete disagreement, assuming that attitudes can be measured.

Types of Likert scales with examples

The <u>Likert scale</u> has become a favorite among researchers to collect opinions about customer satisfaction or employee satisfaction. You can divide this scale primarily into two major types:

- Even Likert Scale
- Odd Likert Scale

Even Likert Scale
Researchers use even Likert scales to collect extreme feedback without providing a neutral option.

- **4-Point Likert Scale for importance**: This type of Likert scale allows researchers to include four extreme options without a neutral choice. Here the various degrees of importance are represented in a 4-Point Likert Scale.
- **8-Point Likelihood of recommendation:** This is a variation of the previously explained 4-point Likert scale, the only difference being, this scale has eight options to collect feedback about the likelihood of a recommendation.

Odd Likert Scale
Researchers use the odd Likert scale to give the respondents the choice of responding neutrally.

- **5-point Likert scale:** With five answer options, researchers use this odd Likert scale question to gather information about a topic by including a neutral answer option for respondents to select if they don't wish to answer from the extreme choices.
- **7-point Likert scale:** The 7-point Likert scale adds two more answer options at extreme ends of a 5-point Likert scale question.
- **9-point Likert scale:** A 9-point Likert scale is quite uncommon, but you can use it by adding two more answer options to the 7-point Likert sc

ale question.

Characteristics of Likert scale

The Likert scale came into existence in 1932 in the form of the 5-point scale, which these days are extensively used. These scales range from a group of general topics to the most specific ones that ask respondents to indicate their level of agreement, approval or, belief. Some significant characteristics of the Likert scale, are:

- **Related answers:** Items should be easily related to the sentence's answers, regardless of whether the relationship between item and sentence is evident.
- **Scale type:** The items must always have two extreme positions and an intermediate answer option that serves as graduation between the extremes.
- **Number of answer options:** It is essential to mention that although the most common Likert scale is that of 5 items, the use of more items helps to generate greater precision in the results.

- **Increasing reliability of the scale:** Researchers often increase the ends of the scale to create a seven-point scale by adding "very" to the top and bottom of the five-point scales. The seven-point scale reaches the upper limits of the reliability of the scale.
- **Using wide scales:** As a general rule, Likert and others recommend that it be better to use a scale as wide as possible. One can always collapse the answers into concise groups, if appropriate, for analysis.
- **Lack of a neutral option:** By considering these details, scales are sometimes curtailed to an even number of categories (usually four) to eliminate the "neutral" possibility on a "forced choice" survey scale.
- **Intrinsic variable:** The primary Likert record clearly states that there could be an inherent variable whose value marks the feedbacks or attitudes of the respondents, and this underlying variable is the interval level, at best.

Likert scale data and analysis

Researchers use surveys regularly to measure and analyze the quality of products or services. The Likert scale is a standard classification format for studies. The respondents provide their opinion (data) about the quality of a product/service from high to low or better to worse using two, four, five, or seven levels.

Researchers and auditors generally group collected data into a hierarchy of four fundamental measurement levels – nominal, ordinal, interval, and ratio measurement levels for further analysis:

- **Nominal data:** Data in which the answers classified into variables need not necessarily have a quantitative data or order is called nominal data.
- **Ordinal data:** Data in which it is possible to sort or classify the answers, but it is impossible to measure the distance is called ordinal data.
- **Interval data:** Aggregate data in which measurements of orders and distances can be made is called interval data.
- **Ratio data:** Ratio data is similar to interval data. The only difference is an equal and definitive ratio between each data and absolute "zero" being treated as a point of origin.
  Data analysis using nominal, interval, and ratio data are generally transparent and straightforward. Ordinal data analyzes data, particularly in regards to Likert or other scales in the surveys. This is not a new problem. The effectiveness of handling ordinal data as interval data continues to be debatable in survey analysis of various applied fields. Some of the significant points to keep in mind are:

- **Statistical tests:** Researchers sometimes treat ordinal data as interval data because they claim that parametric statistical tests are more powerful than nonparametric alternatives. Moreover, inferences from parametric tests are easy to interpret and provide more information than non-parametric options.
- **Concentration on Likert scales:** However, the treatment of ordinal data as interval data without examining the values of the data set and the analysis's objectives can mislead and misrepresent the results of a survey. To analyze scalar data more appropriately, researchers prefer to consider ordinal data as interval data and concentrate on Likert scales.
- **Median or range for inspecting data:** A universal guideline suggests that the mean and the standard deviation are baseless parameters for detailed statistics when the data are on

ordinal scales, just like any parametric analysis based on the normal distribution. The non-parametric test is done based on the appropriate median or range for inspecting data.

Best practices for analyzing the results of Likert scales

Because the Likert element data is discrete, ordinal, and limited in scope, there has been a long dispute over the most logical way to analyze Likert data. The first option is between parametric and non-parametric tests. The advantages and disadvantages of each type of analysis are generally described as the following:

- Parametric tests assume a regular and uninterrupted division.
- Non-parametric tests do not assume a regular or uninterrupted division. However, there are concerns about a lesser ability to detect a difference when one exists.

Which is the best option? This is a real decision that a researcher has to make when deciding to analyze information received from a survey that uses Likert Scale questions.

- Over the years, a series of studies that have tried to answer this question. However, they have been inclined to look at a limited number of potential distributions for Likert data, which causes the generalization of the results to suffer. Thanks to increases in computing power, simulation studies can now thoroughly evaluate a wide range of distributions.
- The researchers identified a diverse set of 14 distributions that are representative of the actual Likert data. The computer program extracted self-sufficient pairs of samples to test all possible combinations of the 14 distributions.
- In total, 10,000 random samples were generated for each of the 98 distribution combinations. The samples' pairs are analyzed using both the two-sample t-test and the Mann-Whitney test to compare the efficacy of each test. The study also evaluated different sample sizes.
- The results show that the Type I error rates (false positive) for all pairs of distributions are very close to the target quantities. If an organization uses any of the analysis and results are statistically significant, it does not need to be too worried about a false positive.
- The results also show that for most pairs of distributions, the difference between the power of the two tests is trivial. If there is a difference at the population level, any of the analysis is equally likely to detect it.
- There are some pairs of specific distributions where there is a power difference between the two tests. If an organization performs both tests on the same data and does not agree (one is significant, and the other is not), this difference in power affects only a small minority of cases.
- In general, the choice between the two analyzes is a loop. If an organization needs to compare two groups of five-point Likert data, the analysis method usually does not matter.
- Both parametric and non-parametric tests, consistently provide the same security against false negatives and also offer the same protection against false positives. These patterns are valid for sample sizes of 10, 30, and 200 per group.

Advantages of Likert scale

There are many advantages of using a Likert Scale in a survey for market research. They are:

- **Ease of implementation:** This universally accepted scale can be easily understood and applied to various customer satisfaction or employee satisfaction surveys.
- **Quantifiable answer options:** Quantify Likert items with no apparent relation to the expression and conduct statistical analysis on the received results.

- **Analyze the rank of opinions:** There may be a sample with varied views about a particular topic. Likert scale offers a ranking of the views of these people surveyed.
- **Simple to respond:** Respondents can understand the intent of this scale and quickly answer the question.

What is the semantic differential scale?

A semantic differential scale is a survey or questionnaire rating scale that asks people to rate a product, company, brand, or any 'entity' within the frames of a multi-point rating option. These survey answering options are grammatically on opposite adjectives at each end. For example, love-hate, satisfied-unsatisfied, and likely to return-unlikely to return with intermediate options in between.

Surveys or questionnaires using the semantic differential scale survey feature is the most reliable way to get information on people's emotional attitude towards a topic of interest.

Charles Egerton Osgood, a famous American psychologist, invented the semantic differential scale so that this 'connotative meaning' of emotional attitude towards entities can be recorded and put to good use.

Osgood conducted this research on an extensive database and found that three scales were commonly useful, irrespective of race or culture or difference in language:

- Estimate: Combination similar to good-bad.
- Authority: Pairs on the lines of powerful-weak.
- Activeness: Combos like active-passive.

Researchers can measure a wide variety of subjects using these combinations, like customers' outlooks about an upcoming product launch or employee satisfaction.

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The ease-of-understanding and the popularity it comes with it makes it extremely reliable. The data collection is accurate due to the versatility that these survey questions come with.

Researchers use the semantic differential scale questions to ask respondents to rate products, organization, or services with multi-point questions with polar adjectives at the extremes of this scale like likely/ unlikely, happy/sad, loved the service/ hated the service.

Semantic differential scale examples & question types

1. Slider rating scale: Questions that feature a graphical slider give the respondent a more interactive way to answer the semantic differential scale question.

Which of the following categories best describes your last experience purchasing a product or service on our website?

	Very Pleasant	Somewhat Pleasant	Neither Pleasant nor Unpleasant	Somewhat Unpleasant	Very Unpleasant
My experience was	Somewhat Pleasant				

Next

2. Non-slider rating scale: The non-slider question uses typical radio buttons for a more traditional survey look and feel. Respondents are more used to answering.

Given your most recent experience, please rate the following question on a scale of 1 to 7.

	(1) Very Unlikely	(2)	(3)	(4)	(5)	(6)	(7) Very Likely
How likely are you to use our service again?	○	○	○	○	○	○	○

< **Next**

3. Open-ended questions: These questions give the users ample freedom to express their emotions about your organization, products, or services.

Comments/Suggestions:

< **Next**

4. Ordering: The ordering questions offer the scope to rate the parameters that the respondents feel are best or worst according to their personal experiences.

Based on what you have seen, heard, and experienced, please rank the following brands according to their reliability. Place a "1" next to the brand that is most reliable, a "2" next to the brand that is next most reliable, and so on. Remember, no two cars can have the same ranking.

Ford	-- Select -- ∨
BMW	-- Select -- ∨
Chrysler	-- Select -- ∨
Chevrolet	-- Select -- ∨

< **Next**

5. Satisfaction rating: The easiest and eye-catchy semantic differential scale questions are the satisfaction rating questions.

How satisfied are you with our services

Very Unsatisfied   Unsatisfied   Neutral   Satisfied   Very Satisfied

<   **Done**

Advantages of semantic differential

- The semantic differential has outdone the other scales like the Likert scale in vitality, rationality, or authenticity.
- It has an advantage in terms of language too. There are two polar adjectives for the factor to be measured and a scale connecting both these polar.
- It is more advantageous than a Likert scale. The researcher declares a statement and expects respondents to either agree or disagree with that.
- Respondents can express their opinions about the matter in hand more accurately and entirely due to the polar options provided in the semantic differential.
- In other question types like the Likert scale, respondents have to indicate the level of agreement or disagreement with the mentioned topic. The semantic differential scale offers extremely opposite adjectives on each end of the range. The respondents can precisely explain their feedback that researchers use for making accurate judgments from the survey.
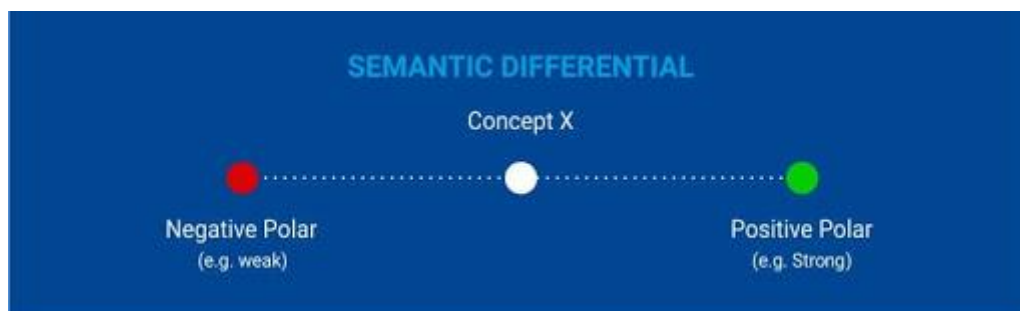
- Researchers can gain perception of concepts, attitudes, and opinions using the verbally different terms as a measuring tool using the semantic differential scale.

Points to consider while using the semantic differential

QuestionPro provides you with the necessary resources to collect all types of various data, including the semantic differential survey feature. When seeking an alternative solution provider, though, consider the following:

- **Creation:** What does it take to get a free account? Can you sign up within a matter of seconds? After you log in, how easy is it to create a survey? Can you create your study within minutes, or are you bombarded with tabs, options, and various windows that it's challenging to manage? What about customization? Can you easily edit your survey any way you wish to fit your specific needs?
QuestionPro gives you the options you need to create a survey.
- **Distribution:** Once your survey is complete, how difficult is it to send it out? Does your solution offer access to edit and manage a personal email list for delivery? How about giving you a direct hyperlink so you can easily share your survey on Facebook or LinkedIn? What about giving you embeddable HTML code to post your study on a website or blog? QuestionPro offers all the mentioned solutions.
- **Analysis:** After you're done collecting your respondents' answers, how easy is reporting the results? Do you have access to a snapshot during the collections process to see an overview of the results? How easy is filtering the data? How about if you need a more detailed analysis? Can you export the results & put them into Excel for more in-depth evaluation?