BBA/MBA 5 year Integrated Course II Year - IV Semester
Paper No. 4.5 Business Research Methods

Unit – I:

Meaning and Importance of Business Research: Business Research, marketing information system - Marketing decision support system. Research design Introduction to design of experiments -Exploratory, causative, conclusive and experimental designs.

Unit – II:

Business Research Process: Sources and methods of gathering marketing information - Respondents, Experiments, Simulation (as a source of Data Generations) and Panels. Sampling design and Sample size determination.

Unit – III:

Measurement and scaling: Measurement and scaling - Concept of measurement and scaling – Types of Scales - Nominal ,Ordinal, Interval and Ratio Scales - Attitude scales Thurstone's, Likert's, Guttman's, Semantic differential, Reliability and validity of a scales. Design of questionnaire.

Unit – IV:

Non-Parametric Statistics in Research: McNemar, Sign Test –One and Two samples, Run test, Wilcoxon Matched pairs test, Mann-Whitney test, Kolmogorov – Simronov D test, Kruskal –Wallis tests.

Unit – V:

Multi-Variety analysis: Structural and Functional methods-Factor analysis, Cluster analysis, Discriminate analysis, conjoint analysis, Multi Dimensional Scaling. Multiple Regression (Numerical with two independent variables).**Research report** - preparation - and presentation - Oral and written presentation.

Research

Meaning and definition

Research in common parlance refers to a search for knowledge. It is a scientific and systematic search for pertinent information on a specific topic. Research is an art of scientific investigation.

- Research comprises of defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis. – Clifford Woody
- Research is the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analyzing the facts and reaching certain conclusions either in the form of solution(s) toward the concerned problem or in certain generalizations for some theoretical formulation.

Research is, thus, an original contribution to the existing stock of knowledge making for its advancement. It is the pursuit of truth with the help of study, observation, comparison and experiment. In short, the search for knowledge thru objective and systematic method of finding solution to a problem is research.

Objectives of research

- To gain familiarity with a phenomenon or to achieve new insights into it (exploratory or formative research studies)
- To portray the characteristics of a particular individual, situation or a group.(descriptive research studies)
- To determine the frequency with which something occurs or with which it is associated with something else (diagnostic research studies)
- To test a hypothesis of a causal relationship between variables (hypothesis testing research studies)

Types of research

- *Descriptive vs Analytical research*
  Descriptive research includes surveys and fact finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. Also known as ex post facto research, this research is used to measure items such

as frequency of shopping, preferences of people, or similar data. The researcher has no control over the variables; he can only report what has happened or what is happening and discover causes. This research aims at finding who, what, when, where and how of a topic. This research is carried on thru interview, questionnaire, observation, tests and records.

In analytical research, the researcher has to use facts or information already available and analyze these to make critical evaluation of the material.

- *Applied vs Fundamental (basic) research*

  Applied research aims at finding a solution for an immediate problem facing a society or an industrial/business organization. Research to identify social, political or economic trends that may affect a particular institution, marketing research, etc. are examples of applied research. The central aim of applied research is to discover a solution to a pressing problem. This is also known as pure research.

  Fundamental research I mainly concerned with the formulation of theory. Gathering knowledge for knowledge sake is fundamental research. Research concerning some natural phenomenon or relating to pure mathematics and studies pertaining to human behavior are examples of fundamental research. Basic research is directed towards finding information that has a broad base of applications and thus, adds to already existing body of scientific knowledge.

- *Quantitative vs Qualitative research*

  Quantitative research is based on the quantitative measurement of some characteristics. It is applicable to phenomena that can be expressed in terms of quantities.

  Qualitative research is concerned with qualitative phenomenon (relating to or involving quality or kind). Motivation research which is qualitative in nature is an aspect of human behavior research. This aims to discover underlying motives and desires, using in depth interviews for the purpose. Word association tests, sentence completion tests, story completion tests and attitude tests are all qualitative research studies. Qualitative research is very important in studying human behavior.

- *Conceptual vs Empirical research*

  Conceptual research is that research related to some abstract ideas or theory. It is generally used by philosophers, and thinkers to develop new concepts or to reinterpret existing ones.

  Empirical research relies on experience or observation alone, often without due regard for system and theory. It is data based research, coming up with conclusions that are capable of being verified by observation or experiment. Also known as experimental type of research, it requires the researcher to provide himself with a working hypothesis or guess as to the probable results. He then works to get enough facts to prove or disprove the hypothesis. Such research is characterized by the experiment's control over the variables under study and his deliberate manipulation of one of them to study its effects. Evidence

gathered thru experiments or empirical studies are considered to be the most powerful support possible for testing a given hypothesis.

- *Conclusion oriented vs Decision oriented research*
  While doing conclusion oriented research, a researcher is free to pick up a problem, redesign the enquiry as he proceeds and is prepared to conceptualize as he wishes. Decision oriented research is always for the need of the decision maker and the researcher in this case is not free to embark on research according to his own inclination. Operations research is decision oriented research as it is a scientific method of providing executive department with a quantitative base for decisions regarding operations under their control.
- *One-time research vs Longitudinal research*
  One-time research is confined to a single time period, whereas in the later case the research is carried on over several time-periods.
- *Field setting research or Laboratory (Simulation) research* – based on the environment in which it is carried out
- *Clinical or diagnostic research* follows case study methods or in depth approaches to reach the basic causal relations. Such studies usually go deep into the causes of things or events that interest us, using very small samples and very deep probing data gathering devices.
- *Exploratory research* aims to gain familiarity with a phenomenon or acquiring new insights into it in order to formulate a more precise problem or develop hypotheses rather than their testing. This is done thru Literature survey, Experience survey or Case study.
- *Action research* is the process by which practitioners attempt to study their problems scientifically in order to guide, correct and evaluate their decisions and actions.
- *Historical research* is that which utilizes historical sources like documents, books, diaries, memoirs, agreements, biographies, paintings, portraits charts, maps, remains, etc. to study events or ideas of the past, including the philosophy of persons and groups at any remote point of time. The objective is to locate, evaluate and synthesize evidence in order to establish facts and draw conclusion concerning the past.

Steps in research process

1. *Formulating the research problem*

There are two types of research problems, those which relate to states of nature and those which relate to relationships between variables. The researcher must single out the research problem he wants to study. Initially, the problem may be stated in general broad way and then the ambiguities, if any, relating to the problem may be resolved. The formulation of a general topic into a specific research problem thus, constitutes the first step in a scientific enquiry. Two steps involved in formulating the research problem are (i) understanding the problem thoroughly and (ii) rephrasing the same into meaningful terms from an analytical

point of view. The researcher must examine all available literature (conceptual & empirical) to get himself acquainted with the selected problem and rephrase the problem into analytical or operational terms. Subsequently many such formulations are made, each formulation more specific than the previous one, each more realistic in terms of the available data and resources.

2. *Extensive Literature Survey*

Once the problem is formulated, a brief summary of it should be written down. Extensive literature survey is hen required. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go. Academic journals, conference proceedings, government reports, books, etc. must be tapped depending on the nature of the problem. Earlier studies similar to the study in hand should be carefully analyzed.

3. *Development of working hypothesis*

Working hypothesis (or hypotheses) is a tentative assumption made in order to draw out and test its logical or empirical consequences. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested. Hypothesis delimits the area of research, focuses attention on the more important facets of the problem, and also indicates the type of data required and the type of methods of data analysis to be used. Hypothesis development is facilitated by discussions with colleagues and experts about the problem, its origin and the objectives in seeking a solution; examination of data records, if available, concerning the problem for possible trends, peculiarities and other clues; review of similar studies; original field interviews. Working hypothesis is not needed in case of exploratory or formulative researches.

4. *Preparing the research design*

This step involves stating the conceptual structure within which research would be conducted. There are several research designs, such as, experimental and non-experimental hypothesis testing. Experimental designs may be informal or formal designs. Informal designs include before-after without control, after-only with control and before-after with control designs. Formal designs are Latin square design, simple and complex factorial designs. The researcher must select one for his own project. Appropriate research design should be prepared considering the following: (a) the means of obtaining the information (b) the availability and skills of the researcher (c) explanation of the way in which selected means of obtaining information will be organized and the reasoning lading to the selection; (d) the time available for research and (e) the cost factor relating to research and the finances available.

5. *Determining sample design*

All the items under consideration in any field of inquiry constitute a ‘universe’ or ‘population’. Complete enumeration of all the items in the population, known as a census inquiry, is not possible in practice. Quite often only a few items from the population are selected for study. The items so selected constitute a sample. The researcher must decide the way of selecting a sample known as sample design. It is a definite plan determined before any data is actually collected. The plan to select 12 out of a city’s 200 drug stores in a certain way constitutes a sample design. Samples can be probability samples or non-probability samples. There are several types of sampling procedures under each of these sampling techniques. Several methods may be used in the same study in which case it is called mixed sampling. Use of Probability or Random sampling reduces bias and sampling error can be estimated.

6. Collecting the data

The task of data collection begins after a research problem has been defined and research design has been chalked out. Two types of data appropriate for research are primary data and secondary data. Primary data are those collected afresh for the first time, and thus happen to be original in character. Secondary data, on the other hand, are those which have been already collected by someone else and have already passed thru statistical processes. The researcher would have to decide which sort of data he would be using for his study and accordingly he will have to select one or other method of data collection. The methods of collecting primary and secondary data differ since primary data are to be originally collected, while secondary data can be compiled from existing sources. Primary data can be collected thru observation, interview, questionnaires or schedules. Secondary data may be published or unpublished data. Published data are available in (a) various publications of central, state and local governments; (b) various publications of foreign governments or international bodies and their subsidiary organizations; (c) technical and trade journals; (d) books, magazines and newspapers; (e) reports and publications of various associations connected with business and industry, banks, stock exchanges, etc.; (f) reports prepared by research scholars, universities, economists, etc. in different fields; and (g) public records and statistics, historical documents, and other sources of published information.

7. Execution of the project

The researcher should see that the project is executed in a systematic manner and or time. If the survey is to be conducted by means of structured questionnaires, data can b readily machine processed. If the data is to b collected thru interviews, then the interviewers must be properly selected and trained. Occasional checks must be made to ensure that interviewers are doing their jobs correctly. This means that steps should b taken to ensure that the survey is under statistical control so that the collected information is in accordance with the predefined standard of accuracy.

8. Analysis of the data

The analysis of data requires such steps as groping the data into manageable groups, coding, tabulation and then drawing statistical inferences. Coding is categorizing data and transforming into symbols that may be tabulated and counted. Editing improves the quality of the data and tabulation puts the data in the form of tables. Analysis after tabulation involves using any statistical measures like percentages, coefficients, etc.

9. Hypothesis testing

After analyzing the data, the researcher is in a position to test the hypothesis, if any, he had formulated earlier. Do the facts support the hypothesis or do they happen to be contrary? Various tests such as Chi square test, t-test, F test have been developed by statisticians for the purpose. The hypothesis may be tested thru the use of one or more of the tests depending upon the nature and object of research inquiry. Hypothesis testing will result in either accepting the hypothesis or rejecting it. If the researcher had no hypothesis to begin with, generalizations established on the basis of data may b stated as hypothesis to be tested by subsequent researches in time to come.

10. Generalizations and interpretation

If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalization. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory. It is known as interpretation. Interpretation may trigger new questions and lead to further research.

11. Preparation of the report or the thesis

Finally, the researcher has to prepare the report of what has been done by him. Report writing should be done carefully keeping in view

(i) The layout of the report that includes the preliminary pages, the main text and the end matter. In preliminary pages the report should carry title and date followed by acknowledgements and foreword. Then there should be table of contents followed by a list of tables and list of illustrations, if any, given in the report. The main text of the report should have introduction, summary of findings, main report and conclusion. At the end of the report appendices should be enlisted. Bibliography should also be given at end.

(ii) Style of the report – report should be in concise and objective style in simple language avoiding vague expressions.

(iii) Charts and illustrations in the main report should be used only if they present the information more clearly.

(iv) Calculated ‘confidence limits’ must be mentioned and the various constraints experienced in conducting research operations may s well be stated.

Criteria of good research

(i) The purpose of research should be clearly defined and common concepts be used.
(ii) The research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained.
(iii) The procedural design of the research should be carefully planned to yield results that are as objective as possible.
(iv) The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.
(v) The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully.
(vi) Conclusion should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis.
(vii) Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis.
(viii) Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and I a person of integrity.

A good research is

(i) Systematic: It means that research is structured with specified steps to be taken in a specified sequence in accordance with the well defined set of rules. Systematic research rejects the use of guessing and intuition in arriving at conclusions.
(ii) Logical: This implies that research is guided by the rules of logical reasoning and the logical process of induction and deduction are of great value in carrying out research. Induction is the process of reasoning from a part to the whole whereas deduction is the process of reasoning from some premise to a conclusion which follows from that very premise. Logical reasoning makes research more meaningful in the context of decision making.
(iii) Empirical: It implies that research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity to research results.
(iv) Replicable: Research results can be verified by replicating the study and thereby building a sound basis for decisions.

Research design

RD is the plan structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance.

Plan is an outline of the research scheme on which the researcher is to work.

Structure is a more specific outline or the scheme.

Strategy shows how the research will be carried out, specifying the methods to be used in collection and analysis of data.

RD is the framework or the plan for a study that is used as a guide in collecting and analyzing the data. It is the blueprint that is followed in completing a study.

RD is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.

RD is the specification of methods and procedures for acquiring the information needed. It is overall operational pattern or framework of the study that stipulates what information is to be collected from which sources by what procedures.

Phases of RD

1. The sampling design – deals with method of selecting the samples to be observed for the study.
2. The observational design – relates to the conditions under which the observations are to be made.
3. The statistical design which concerns the question of how many items are to b observed and how the information and data gathered is to be analyzed/
4. The operational deign which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

To sum up, RD is a plan that specifies the sources and types of information relevant to the research problem. It is a strategy specifying which approach will be used for gathering and analyzing the data and includes time and cost budgets since most studies are done under these two constraints. RD must, at least contain (a) clear statement of the research problem (b) procedures and techniques to be used for information gathering (c) the population to be studied and (d) methods to be used in processing and analyzing data.

Components of RD

1. Title of the study
2. The problem
3. Survey of literature

4. Geographical and functional dimensions of the study
5. Objectives of the study
6. Hypothesis
7. Methodology of investigation (data collection, sampling plan, size)
8. Statistical tools
9. Interpretation and findings of the study
10. Reporting

Different RDs

I. *Exploratory research also termed as formulative studies*, seeks to discover new relationships between several facts; emphasis is on discovery of new ideas and insights as hardly anything is known about the problem. The researcher explores the nature of the problem and is free to proceed in whatever manner he wants to. Methods used in exploratory studies are

(i) **Literature search** – survey of concerning literature is a simple way of formulating precisely the research problem or developing hypothesis. The literature search has to be relevant to the problem being studied. The search may involve conceptual literature, trade literature and published statistics. Hypothesis stated by earlier researchers may be reviewed as a basis for further research. In case hypotheses have not yet been formulated, the researcher will review the available material for deriving the relevant hypothesis from it. He should also make an attempt to apply concepts and develop theories in different research contexts to the area in which he is working. Various trade and professional journals may be accessed from libraries for the purpose.

(ii) **Experience survey** – survey of people who have had practical experience with the problem to be studied. Inputs are drawn from the reservoir of knowledge and experience possessed by those familiar with the specific subject to be investigated. Experience survey enables the researcher to define the problem more concisely and helps in the formulation of research hypothesis.

(iii) **Focus group** – the researcher brings a small number of individuals together in a room to sit and discuss some topic of interest related to the research problem. The discussion is directed by a moderator.

(iv) **Case study** – case analysis of selected organizations or individuals may be helpful in gaining information and new ideas.

Thus, in an exploratory or formulative study merely leads to insights or hypothesis, whatever method or research design outlined above is adopted.

II. *Conclusive research* provides information which helps the executive to make a rational decision from various alternative decisions.

1. **Descriptive research** studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group. They also establish the relationship between two or more variables for prediction purposes; data is collected for a definite purpose. Descriptive studies are well structured and rigid. These studies answer questions like "who, what, when, where and how" of the subject under investigation. Studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are all examples of descriptive research studies. Most of the social research comes under this category.

   The studies concerning whether certain variables are associated are examples of diagnostic research studies. From RD point of view, descriptive and diagnostic studies share common requirements and are grouped together. The researcher has to

determine the objective of the study, design data collection procedure, select a sample and analyze them and then make statements about the population on the basis of sample analysis. Lastly, the researcher has to communicate the findings to others in the form of a report.

(a) Cross sectional studies:

A cross sectional study is concerned with a sample of elements from a given population. It may deal with households, dealers, retail stores, or other entities. Data on a number of characteristics from the sample elements are collected and analyzed. Field studies are ex-post facto scientific inquiries that aim at finding the relations and inter relations among variables in a real setting. Such studies are done in lie situations like communalities, schools, factories, organizations and institutions.

In survey research detailed information can be obtained from a sample of large population.

(b) Longitudinal studies:

These studies involve panels – true panels and omnibus panels. True panels involve repeated measurements of same variables. Each sample member is measured each time on the same characteristics over a period of time. Such data will reflect changes in the buying behavior of families. Samples in Omnibus panels are selected and maintained and varied information is collected from the samples. At one time, it may be evaluation of ad copy and at another time it may understand the attitude of panel members towards a new soft drink.

2. **Causal research design** investigates the cause and effect relationship between two or more variables.
   (A) Experimental studies, also known as Hypothesis testing research studies are those where the researcher tests the hypothesis of casual relationships between variables. Such studies require procedures that will not only reduce bias and increase reliability, but will permit drawing inferences about casuality. Usually experiments meet this requirement. Research design in such studies means the design of experiments. Experimental design refers to the framework or structure of an experiment and as such there are several experimental designs.

   Controlled experiments involve intervention to control and manipulate variables. Natural experiments involve hardly any intervention. Laboratory experiments Field experiments

Informal experimental designs are those designs that normally use less sophisticated form of analysis based on differences in magnitudes, whereas formal experimental designs offer relatively more control and use precise statistical procedures for analysis.

Informal experimental designs:

- Before-and-after without control design
- After-only with control design
- Before-and-after with control design

Formal experimental designs

- Completely randomized design (CR design)
- Randomized block design (RB Design)
- Latin square design (LS Design)
- Factorial designs

Informal experimental designs:

Before-and-after without control design

In such a design a single test group or area is selected and the dependent variable is measured before the introduction of the treatment. The treatment is then introduced and the dependent variable is measured again after the treatment has been introduced. The effect of the treatment would be equal to the level of the phenomenon after the treatment minus the level of the phenomenon before the treatment. The design can be represented as:

Test area:	Level of phenomenon before treatment (X)	Treatment introduced ----------→	Level of phenomenon after treatment (Y)
	Treatment Effect = (Y) – (X)		

After-only with control design

In this two groups or areas (test area and control area) are selected and the treatment is introduced into the test area only. The dependent variable is then measured in both the areas at the same time. The dependent variable is then

measured in both the areas at the same time. Treatment impact is assessed by subtracting the value of the dependent variable in the control area from its value in the test area. The design can be represented as:

Test area:	Treatment introduced	Level of phenomenon after treatment (Y)
Control area:	----------→	Level of phenomenon without treatment (Z)
	Treatment Effect = (Y) – (X)	

then introduced into the test area only, and the dependent variable is measured in both for an identical time-period after the introduction of the treatment. The treatment effect is determined by subtracting the change in the dependent variable in the control area from the change in the dependent variable in test area. The design can be represented as:

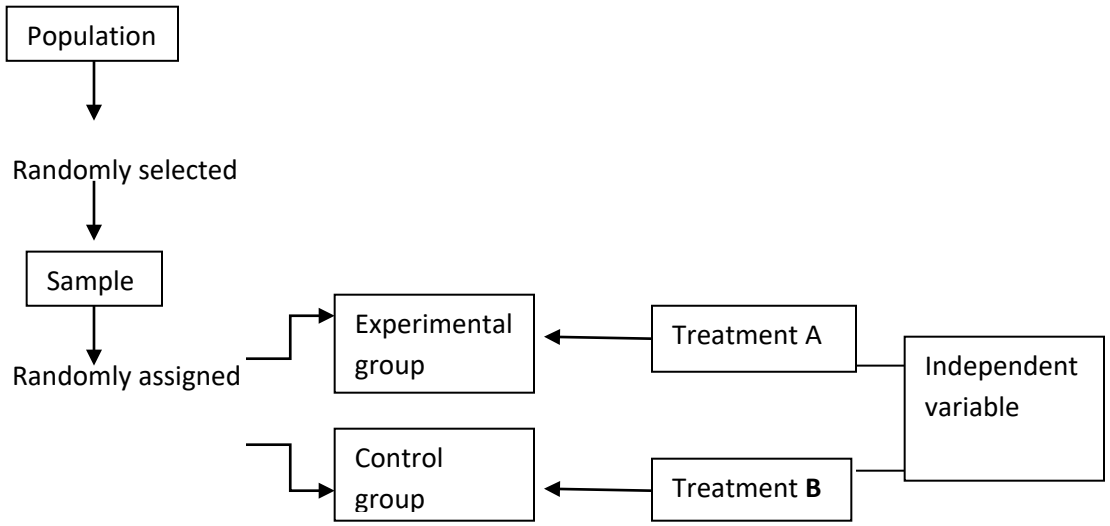
	Time Period 1		Time Period 2
Test area:	Level of phenomenon before treatment (X)	Treatment introduced ----------→	Level of phenomenon after treatment (Y)
Control area:	Level of phenomenon without treatment (A)		Level of phenomenon without treatment (Z)
	Treatment Effect = (Y-X) – (Z-A)		

Formal experimental designs:

Completely randomized design (CR design)

This involves two principles – the principle of replication and the principle of randomization of experimental designs. Two forms of C.R.Design are

(i) Two group simple randomized experimental design: In two-group simple randomized design, a population is defined first and then a sample is selected randomly. Items selected randomly are then randomly assigned to the experimental and control groups. Thus, the design yields two groups as representatives of the population. Diagrammatically this design is stated as:



The two groups (experimental & control groups) of such a design given different treatments of the independent variable.

(ii) Random replication design: Under this design two populations- population available for study and population available to conduct experiments - are defined. A sample is taken randomly from the population available for study and is randomly assigned to, say, four experimental and four control groups. Similarly, a sample is taken randomly from the population available to conduct experiments and he eight individuals so selected are randomly assigned to eight groups. Generally, equal number of items are put under each group so that the size of the group I not likely to affect the result of the study. Variables relating to both population characteristics are assumed to be randomly distributed among the two groups. Thus, this random replication design is, in fact, an extension of the two-group simple randomized design. It provides a number of repetitions for each treatment. Each repetition is technically called a ‘replication’. Random replication

design serves two purposes – it provides controls for the differential effects of the extraneous independent variables and secondly, it randomizes any individual differences among those conducting the treatments.

Randomized block design (RB Design)

Randomized Block Design is an improvement over the C.R. design. In this design subjects are first divided into groups, known as blocks, such that within each group the subjects are relatively homogeneous in respect to some selected variable. The number of subjects in a given block would be equal to the number of treatments and one subject in each block would be randomly assigned to each treatment. In general, blocks are the levels at which we hold the extraneous factor fixed, so that its contribution to the total variability of data can be measured. Treatment appears the same number of times in each block. The R.B. design is analyzed by the two way analysis of variance technique.

Latin square design (LS Design)

This is an experimental design frequently used in agricultural research and when there are two major extraneous factors such as the varying soil fertility and varying seeds. The Latin square design is one wherein each fertilizer, for example, appears 5 times but is used only once in each row and in each column of the design. The treatments in a LS design are so allocated among the plots that no treatment occurs more than once in any one row or any one column. The two blocking factors may be represented thru rows and columns. The following is the diagrammatic representation of the same. (5 types of fertilizers –A, B, C, D & E and two blocking factors -varying soil fertility and varying seeds).

Fertility level

Seeds differences

	I	II	III	IV	V
X_1	A	B	C	D	E
X_2	B	C	D	E	A
X_3	C	D	E	A	B
X_4	D	E	A	B	C
X_5	E	A	B	C	D

The diagram shows that the field is divided into as many blocks as there are varieties of fertilizers and then each block is again divided into as many parts as there are varieties of fertilizers in such a way that each of the fertilizer variety is used in each of the blocks only once. This analysis is similar to two-way analysis of variance technique. Mostly, L.S. designs of orders (5X5) to (9X9) are generally used.

Factorial designs

Factorial designs are used in experiments where the effects of varying more than one factor are to be determined. They are specially used in several economic and social phenomena where usually a large number of factors affect a particular problem. These designs may be (i) Simple factorial designs and (ii) Complex factorial designs.

(i) Simple factorial designs: here we consider the effect of varying two factors on the dependent variable. It is also termed ad two-factor factorial design.

(ii) Complex factorial designs: experiments with more than two factors at a time involve the use of complex factorial designs or multi-factor factorial designs. Three or more independent variables are considered simultaneously.

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Paper – 4.5: Business Research Methods

Chapter Number	Topic	Resource	Ppt/doc
1	**Meaning and Importance of Business Research:** Business Research, marketing information system - Marketing decision support system. Research design Introduction to design of experiments - Exploratory, causative, conclusive and experimental designs.	https://www.youtube.com/embed/eziPtAuNiTI https://www.youtube.com/embed/3POJrnhGjX0 https://www.youtube.com/embed/HvXOuYBuME0 https://www.youtube.com/embed/d24nPG6l_X0	pdf
2	**Business Research Process**: Sources and methods of gathering marketing information - Respondents, Experiments, Simulation (as a source of Data Generations) and Panels. Sampling design and Sample size determination.	https://nptel.ac.in/courses/110/107/110107080/	pdf
3	**Measurement and scaling:** Measurement and scaling - Concept of measurement and scaling – Types of Scales - Nominal ,Ordinal, Interval and Ratio Scales - Attitude scales Thurstone's, Likert's, Guttman's, Semantic differential, Reliability and validity of a scales. Design of questionnaire.	https://nptel.ac.in/courses/110/107/110107113/	pdf
4	**Non-Parametric Statistics in Research:** McNemar, Sign Test –One and Two samples, Run test, Wilcoxon Matched pairs test, Mann-Whitney test, Kolmogorov – Simronov D test, Kruskal –Wallis tests	https://www.youtube.com/embed/vhG5YzRErPY http://ugcmoocs.inflibnet.ac.in/ugcmoocs/view_module_ug.php/33 http://ugcmoocs.inflibnet.ac.in/ugcmoocs/view_module_pg.php/1168 http://ugcmoocs.inflibnet.ac.in/ugcmoocs/view_module_pg.php/1168	pdf
5	**Multi-Variety analysis:** Structural and Functional methods-Factor analysis, Cluster analysis, Discriminate analysis, conjoint analysis, Multi Dimensional Scaling. Multiple Regression (Numerical with two independent variables).**Research report** - preparation - and presentation - Oral and written presentation.	*https://nptel.ac.in/courses/110/105/110105091/*	pdf

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Measurement & Scaling

Measurement

Measurement implies using numbers to describe a specified feature of a given item.

- Measurement is defined as the assignment of numbers to characteristics of objects or events according to rules. It may be observed that measurement does not mean measurement of objects or events but the characteristics of interest in the concerned objects or events. We don't measure a product or buyer but we measure the characteristics of the product or buyer.
- Measurement is defined as a process of associating numbers or symbols to observations obtained in a research study. These observations could be qualitative or quantitative.
- Measurement is the process of observing and recording the observations that are collected as part of research. The recording of the observations may be in terms of numbers or other symbols to characteristics of objects according to certain prescribed rules. The respondent's, characteristics are feelings, attitudes, opinions etc. The most important aspect of measurement is the specification of rules for assigning numbers to characteristics. The rules for assigning numbers should be standardized and applied uniformly. This must not change over time or objects.

Quantitative and qualitative data

While most of the analysis (mean, standard deviation, etc.) can be conducted using quantitative data, even qualitative data can also be assigned numbers. For instance, "Yes" or "No" answers to a question can be recorded as 0 & 1. In this nominal or artificial way, descriptive data can b made into numerical data.

Nominal data is numerical in name only, because they do not share any of the properties of numbers we deal in ordinary arithmetic. For instance, if we record marital status as 1,2,3,4 then we cannot write 4>2 or 4/2=2. When only inequalities can be set up, then that data is called ordinal data. The > symbol in connection with ordinal data may be used to designate "happier than", "preferred to" and so on. When in addition to setting up inequalities differences can also be formed, then that data is referred to as interval data. For example, for temperatures on a Fahrenheit scale it can be said that 950 – 750 = 1350 - 1100. But the scale has artificial origin (zero) that does not indicate absence of temperature. When all customary operations of mathematics can be performed, then that data is called ratio data. Ratio data includes all usual measurement of length, height, money amounts, weight, volume, area, pressures, etc.

Scaling

Scaling is the assignment of objects to numbers or semantics according to a rule. In scaling, the objects are text statements, usually statements of attitude, opinion, or feeling.

Scaling involves creating a continuum upon which measured objects are located. Consider an attitude scale from 1 to 100. Each respondent is assigned a number from 1 to 100, with 1 =

Extremely Unfavorable, and 100 =Extremely Favorable. Measurement is the actual assignment of a number from 1 to 100 to each respondent. Scaling is the process of placing the respondents on a continuum with respect to their attitude toward department stores.

Classification of measurement scales

Scales of measurement can be considered in terms of their mathematical properties. The most widely used classification of measurement scales are (a) nominal scale (b) ordinal scale (c) interval scale (d) ratio scale.

Nominal scale: Nominal scale is a system of assigning number symbols to events in order to label them. Assignment of numbers to basketball players in order to identify them is an example of nominal scale. The numbers are just convenient labels for a particular class of events and their order is of no consequence. One cannot do much with the numbers except tracking people, objects and events. The nominal scale does not express any values or relationships between variables. The nominal scale is often referred to as a categorical scale. The assigned numbers have no arithmetic properties and act only as labels. Calculating mean of these numbers does not make sense nor does comparison of numbers of one group with that of other group. The counting of numbers in each group is the only possible arithmetic operation when a nominal scale is employed. While mode may be computed as a measure of central tendency, there is no measure of dispersion for nominal scales. Chi square test is the most common test of statistical significance.

Ordinal scale: The lowest level of 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. Ordinal Scale involves the ranking of items along the continuum of the characteristic being scaled. In this scale, the items are classified according to whether they have more or less of a characteristic. The main characteristic of the ordinal scale is that the categories have a logical or ordered relationship. This type of scale permits the measurement of degrees of difference, (i.e. 'more' or 'less') but not the specific amount of differences (i.e. how much 'more' or 'less'). Rank orders represent ordinal scales and are frequently used in research relating to qualitative phenomenon. A student's rank in his graduation class involves the use of an ordinal scale. Scores based on ordinal scales have to be interpreted carefully. For instance, if X's position in his class is 10 and Y's position is 40, it cannot be said that X's position is four times as good as that of Y. 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' without 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 rank meaning, the appropriate measure of ventral tendency is the median. Percentiles or quartiles may also be used. Correlations are restricted to various rank order measures. Non parametric tests are applicable.

This scale is very common in marketing, satisfaction and attitudinal research. For example, a fast food home delivery shop may wish to ask its customers: How would you rate the service of our staff? (1) Excellent • (2) Very Good • (3) Good • (4) Poor • (5) Worst •

Interval Scale: Interval Scales have intervals that are adjusted in terms of some rule that has been established as a basis for making the units equal. The units are equal subject to the assumptions on which the rule is based. It is a scale in which the numbers are used to rank attributes such that numerically equal distances on the scale represent equal distance in the characteristic being measured. Interval scales have an arbitrary zero but not absolute zero or unique origin. An interval scale contains all the information of an ordinal scale, but it also one allows to compare the difference/distance between attributes. Interval scales may be either in numeric or semantic formats. The interval scales allow the calculation of averages like Mean, Median and Mode and dispersion like Range and Standard Deviation. For example, the difference between '1' and '2' is equal to the difference between '3' and '4'. Further, the difference between '2' and '4' is twice the difference between '1' and '2'. Measuring temperature is an example of interval scale. But, we cannot say 40°C is twice as hot as 20°C.

Interval scales provide more powerful measurement than ordinal scales as interval scales incorporate the concept of equality of interval. More powerful statistical measures mean and standard deviation can be used. Generally used tests of statistical significance are t' test and 'F' test.

Ratio Scale: Ratio scale is the highest level of measurement scales. This has the properties of an interval scale together with a fixed (absolute) zero point. The absolute zero point allows us to construct a meaningful ratio. Ratio scales permit the researcher to compare both differences in scores and relative magnitude of scores. Ratio scale represents the actual amount of variables. Measures of physical dimensions such as weight, height, distance, etc. are examples. Generally, all statistical techniques are usable with ratio scales. Multiplication and division can be used with these scales but not with any of the above scales. Geometric and harmonic means can be calculated and coefficient of variation may also be calculated.

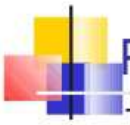
For example, the number of customers of a bank's ATM in the last three months is a ratio scale. This is because one can compare this with previous three months. For example, the difference between 10 and 15 minutes is the same as the difference between 25 and 30 minutes and 30 minutes is twice as long as 15 minutes.

Thus, proceeding from the nominal scale to ratio scale, relevant information is obtained increasingly.

Summary of Levels of Measurement

Level of measurement	Put data in categories	Arrange data in order	Subtract data values	Determine if one data value is a multiple of another
Nominal	Yes	No	No	No
Ordinal	Yes	Yes	No	No
Interval	Yes	Yes	Yes	No
Ratio	Yes	Yes	Yes	Yes

8-13



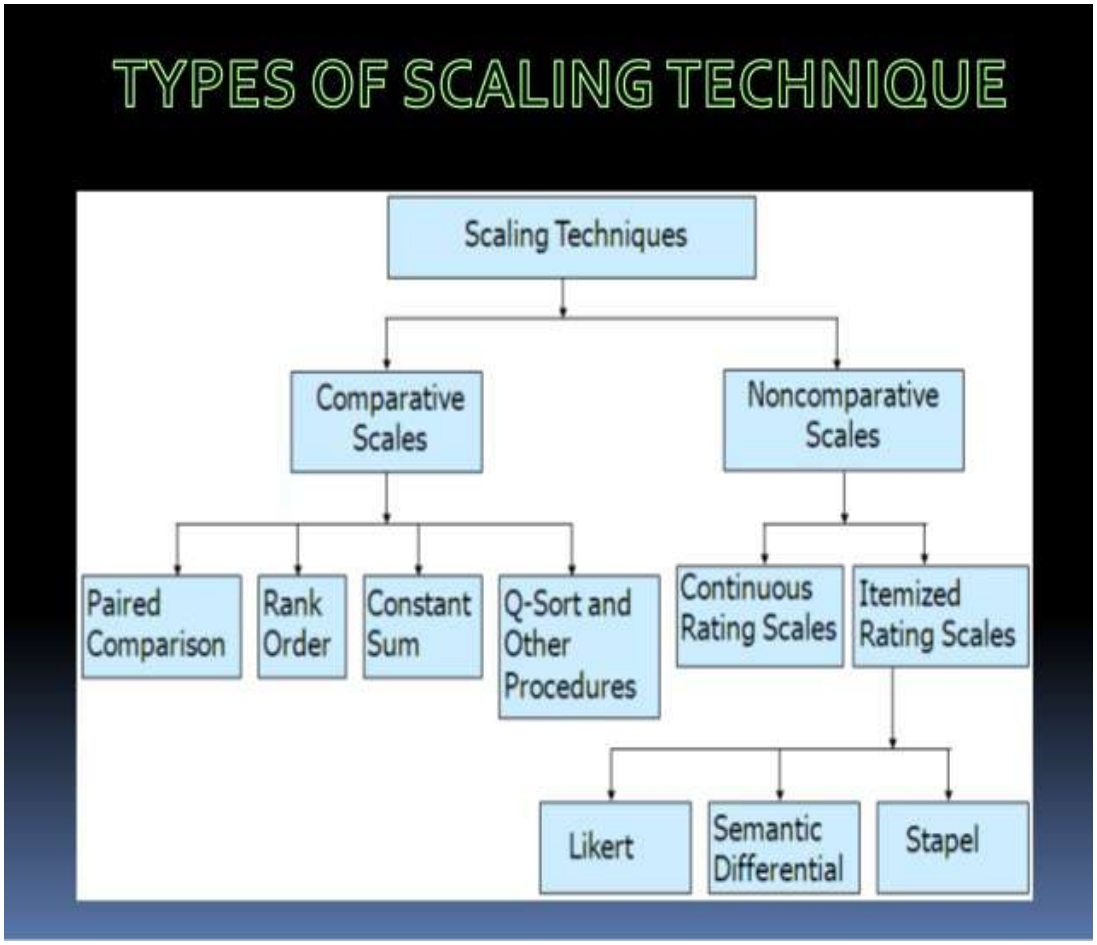
Primary Scales of Measurement

Table 8.1

Scale	Basic Characteristics	Common Examples	Marketing Examples	Permissible Statistics	
				Descriptive	Inferential
Nominal	Numbers identify & classify objects	Social Security nos., numbering of football players	Brand nos., store types	Percentages, mode	Chi-square, binomial test
Ordinal	Nos. indicate the relative positions of objects but not the magnitude of differences between them	Quality rankings, rankings of teams in a tournament	Preference rankings, market position, social class	Percentile, median	Rank-order correlation, Friedman ANOVA
Interval	Differences between objects	Temperature (Fahrenheit)	Attitudes, opinions, index	Range, mean, standard	Product-moment
Ratio	Zero point is fixed, ratios of scale values can be compared	Length, weight	Age, sales, income, costs	Geometric mean, harmonic mean	Coefficient of variation

Scaling techniques

Several scaling techniques are employed to study the relationship between the objects. These are broadly classified as comparative scaling techniques and non-comparative scaling techniques.



Comparative scales involve direct comparison of stimulus objects. Comparative scale data are interpreted in relative terms and are measured on ordinal scale. This technique is a non-numeric technique as ordinal data cannot be used for numeric operations. These techniques are easy to understand and apply. They force the respondents to choose between the stimulus objects. For instance, when respondents are asked if they prefer toothpaste of brand A or brand B, they are forced to choose one even if there is little difference between the two brands. These scales cannot generalize beyond the stimulus objects. For example, if we want to compare toothpaste of brand C with the previous brands, then a new study has to be conducted.

Paired Comparison Scale: This is a comparative scaling technique in which a respondent is presented with two objects at a time and asked to select one object according to some criterion. If there are more than two stimuli to judge, the number of judgments required is given by

$N = N(n+1)/2$ where N – number of judgments and n – number of stimuli to be judged.

The data obtained are ordinal in nature. For example, there are four types of cold drinks Coke, Pepsi, Sprite, and Limca. The respondents can prefer Pepsi to Coke or Coke to Sprite, etc.

Rank order scale: This is another type of comparative scaling technique in which respondents are presented with several items simultaneously and asked to rank them in the order of priority. This is an ordinal scale that describes the favored and unfavored objects, but does not reveal the distance between the objects. The resultant data in rank order is ordinal data. This yields better results when direct comparisons are required between the given objects. For example, for ten items it takes 45 comparisons in paired ranking method whereas the method of rank order requires ranking of 10 items only. Sometimes, respondents may be asked to rank only their first few (say 4) choices only. The Rank order scaling is often used to measure the preference for the brand and attributes. The major disadvantage of this technique is that only ordinal data can be generated.

Preference of cold drink brands using rank order scaling

Instructions: Rank the following brands of cold drinks in order of preference. Begin by picking out the one brand you like most and assign it a number1. Then find the second most preferred brand and assign it a number 2. Continue this procedure until you have ranked all the brands of cold drinks in order of preference. The least preferred brand should be assigned a rank of 4. Also remember no two brands receive the same rank order.

Format:

Brand	Rank
(a) Coke	3
(b) Pepsi	1
(c) Limca	2
(d) Sprite	4

Constant sum scale: The **Constant Sum Scaling** is a technique wherein the respondents are asked to allocate a constant sum of units, such as points, dollars, chips or chits among the stimulus objects according to some specified criterion. It is used to assess the relative importance attached by a respondent to the stimulus objects. **For example**, suppose a respondent is asked to allocate 100 points to the attributes of a body wash on the basis of the importance he attaches to each attribute. In case he feels any attribute being unimportant can allocate zero points and in case some attribute is twice as important as any other attribute can assign it twice the points. The sum of all the points allocated to each attribute should be equal to 100. Once the points are allocated, the attributes are scaled by counting the points as assigned by the respondents to each attribute and then dividing it by a number of respondents under analysis. Such type of information cannot be obtained from rank order data unless it is transformed into interval data. The constant sum scaling is considered as an ordinal scale because of its comparative nature and lack of generalization. This scale is not useful with large number of objects.

Importance of detergent attributes using a constant sum scale

Instructions: Between attributes of detergent please allocate 100 points among the attributes so that your allocation reflects the relative importance you attach to each attribute. The more points an attribute receives, the more important the attribute is. If an attribute is not at all important, assign it zero points. If an attribute is twice as important as some other attribute, it should receive twice as many points.

Format:

Attribute	Number of Points
(a) Price	50
(b) Fragrance	05
(c) Packaging	10
(d) Cleaning Power	30
(e) Lather	05
Total Points	100

Q-Sort Scaling: The Q-Sort Scaling is a Rank order scaling technique wherein the respondents are asked to sort the presented objects into piles based on similarity according to a specified criterion such as preference, attitude, perception, etc. In other words, a scaling technique in which the respondents sort the number of statements or attitudes into piles, usually of 11, on the basis of some specified criterion.

Preference of Magazines Using Q-Sort Scale Procedure

Instructions: The bag given to you contain pictures of 90 magazines. Please choose 10 magazines you 'prefer most', 20 magazines you 'like', 30 magazines to which you are 'neutral (neither like nor dislike)', 20 magazines you 'dislike', and 10 magazines you 'prefer least'. Please list the sorted magazine names in the respective columns of the form provided to you.

Format:

Prefer Most	Like	Neutral	Dislike	Prefer Least
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
(10)	_____	_____	_____	(10)
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	
	(20)	_____	(20)	
		_____		
		_____		
		_____		
		_____		
		_____		
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		_____		
		_____		
		_____		
			(30)	

In Non-comparative scales, each object is scaled independently of the others in the stimulus set. The resulting data are generally assumed to be interval or ratio scaled. Respondents evaluate only one object at a time, and for this reason non-comparative scales are often referred to as monadic scales. For example, the respondents are asked to give preference score on a 1 to 6 scale to brand 'A' of the toothpaste. Here 1 = not preferred at all and 6=highly preferred. Similar score can be obtained for brand 'B' and 'C'.

Non-comparative techniques consist of continuous and itemized rating scales.

Continuous rating scale or Graphic rating scale: Under it various points are usually put along the line to form a continuum and the rater indicates his rating by simply making a mark at the appropriate point on a line that runs from one extreme to the other. Scale points with brief descriptions may be indicated along the line to assist the rater in making a choice.

In other words, respondents rate the objects by placing a mark at the appropriate position on a line that runs from one extreme of the criterion variable to the other. The form of the continuous scale may vary considerably.

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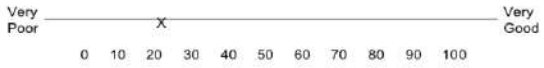
Paper – 4.5: Business Research Methods

Continuous Rating Scale Example



GRAPHIC SCALE RATING

Employee Name .....

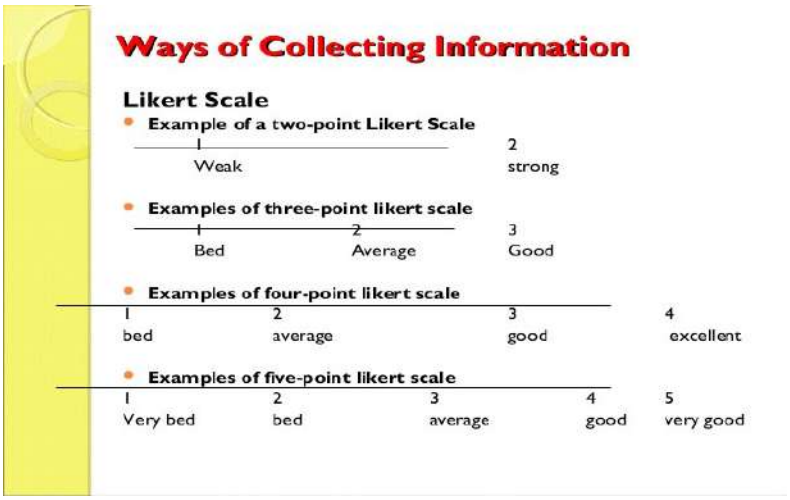
Department .....

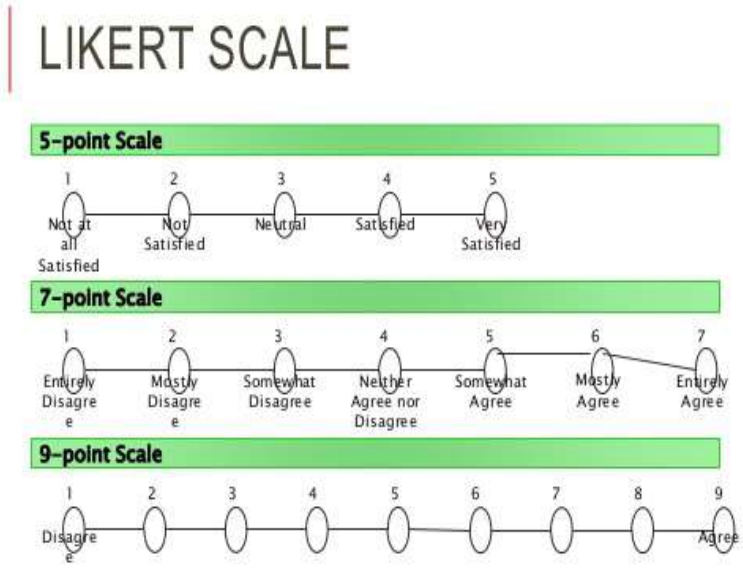
Job Title .....

Performance Level / Work Dimension	Poor	Fairly Poor	Fairly Good	Good	Excellent
Attendance			✔		
Behavior towards Subordinates			✔		
Sincerity				✔	
Dependability					✔

Itemized rating scale: A scale having numbers or brief descriptions of each category is provided. The categories are ordered in terms of scale position, and the respondents are required to select the specified category that best describes the object being rated. The commonly used itemized rating scales are the Likert, semantic differential, and Stapel scales.

Likert scale - The Likert scale requires the respondents to indicate a degree of agreement or disagreement with each of a series of statements about the stimulus objects. Also known as summated scales, these consist of a series of statements which express either a favorable or unfavorable attitude towards the given object to which the respondent is asked to react. The respondent indicates his agreement or disagreement with each statement in the instrument. Each response is given a numerical score, indicating his favorableness or unfavorableness, and the scores are totaled to measure the respondent's attitude. In other words, the overall score represents the respondent's position on the continuum of favorableness-unfavorableness towards an issue. Most frequently used summated scales follow the [pattern devised by Likert and are referred to as Likert-type scales. In Likert scale, the respondent is asked to respond to each of the statements in terms of several degrees, usually 5 (3 or 7 may also be used) degrees of agreement or disagreement.



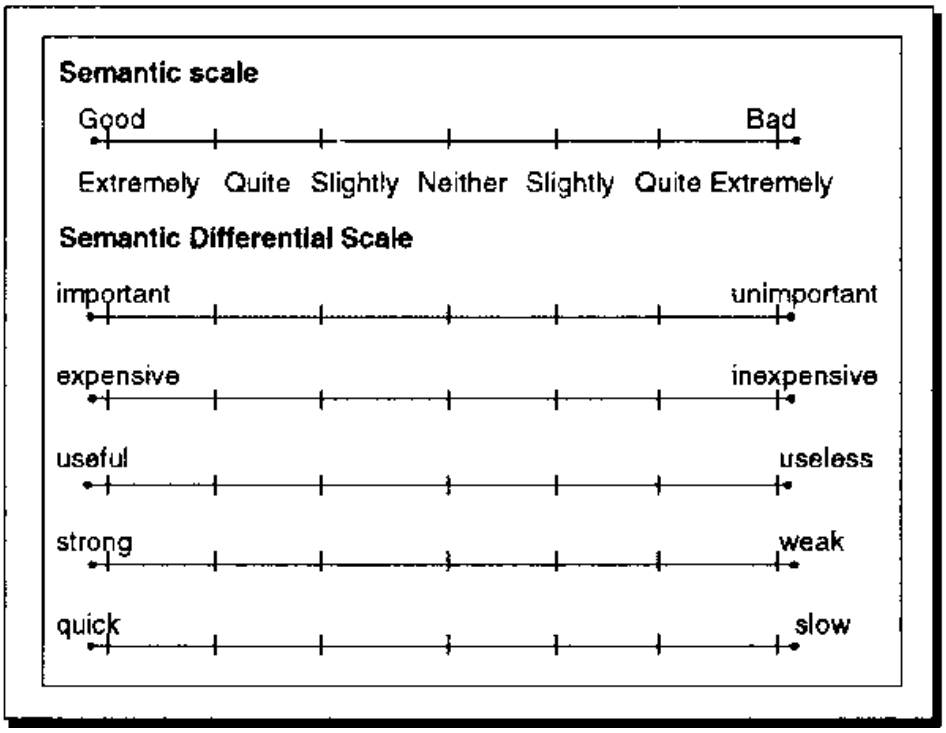


A major limitation of Likert scale is that the positions indicated on the scale may or may not be equally spaced. There is a possibility that people may answer according to what they think they should feel rather than how they do feel. However, this scale is quite useful in measuring 'before and after' attitudes pertaining to an event like change programme, training programme, etc.

Semantic differential scale - Semantic differential scale is a type of a rating scale designed to measure the connotative meaning of objects, events, and concepts. The connotations are used to derive the attitude towards the given object, event or concept. It has a seven-point rating scale with end points associated with bipolar labels that have semantic meaning. The respondent is

asked to choose where his or her position lies, on a scale between two polar adjectives (for example: "Adequate-Inadequate", "Good-Evil" or "Valuable-Worthless") by putting a mark on one of the 7 spaces along each dimension. Semantic differentials can be used to measure opinions, attitudes and values on a psychometrically controlled scale.

Organized	_ _ _ _ X _	Unorganized
Cold	_ X _ _ _ _ _	Warm
Modern	_ X _ _ _ _ _	Old-fashioned
Unreliable	_ _ _ _ _ X _	Reliable
Complex	_ _ _ _ _ X _	Simple



A limitation of semantic differential scale is that the user is really only posed with two options that are opposites, where the Likert scale has a range of intensities to choose from.

The two scales have some middle ground. Technically, the Likert Scale can be designed with opposites, like love/hate or happy/sad. This is similar to the idea of polar opposite adjectives for

the semantic differential scale. Although "like/hate" may be polar opposites, they are not adjectives* and so cannot be included in a semantic differential questionnaire.

Staple scale - The Stapel scale is a unipolar rating scale with ten categories numbered from -5 to +5, without a neutral point (zero). This scale is usually presented vertically. The respondent is asked to select the appropriate numerical response category that best describes the extent to which the adjective related to the object is accurate or inaccurate. The higher the positive score selected by the respondent, the more accurate the adjective describes the object and vice versa.

For example**,** the respondent is asked to rank the quality of food, and crew member service of an airline on a scale ranging from -5 to +5:

+5	+5
+4 X	+4
+3	+3 X
+2	+2
+1	+1
High Food Quality	Poor Crew Service
-1	-1
-2	-2
-3	-3
-4	-4
-5	-5

From the above example, the airline is evaluated as having a high food quality but somewhat a poor cabin crew service.

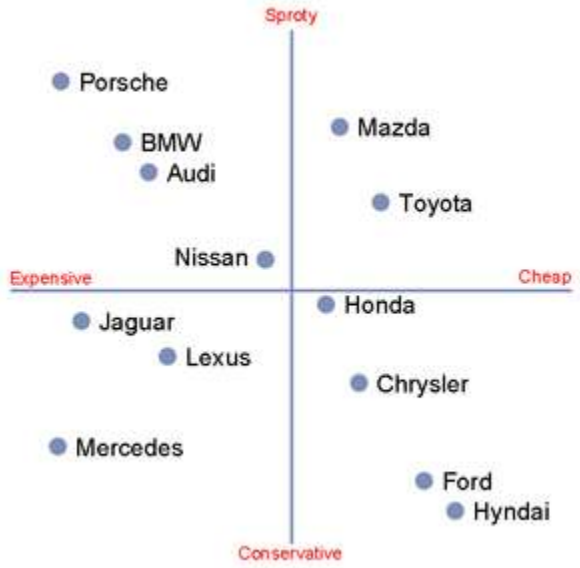
The stapel scale is like a semantic differential scale with little modifications. It is often used in the situations when two bi-polar adjectives are difficult to find out. The data obtained are the interval data and can be analyzed in the same way as semantic differential data.

One of the advantages of the stapel scale is that it does not require the pre-testing of adjectives to ensure their true bipolarity. Also, it can be easily administered

Multi Dimensional Scaling (MDS)

Multidimensional scaling attempts to find the structure in a set of distance measures between objects or cases. "Objects" can be colors, faces, map coordinates, political persuasion, or any kind of real or conceptual stimuli. Objects that are more similar (or have shorter distances) are

closer together on the graph than objects that are less similar (or have longer distances). MDS is used when all the variables in a study are to be analyzed simultaneously and all such variables happen to be independent. The underlying assumption in MDS is that the respondents perceive a set of objects as being more or less similar to one another on a number of usually uncorrelated dimensions.



Perceptual maps with two dimensions, such as the example above, are the most common and easiest to interpret. However, perceptual maps with multiple dimensions representing multiple attributes can provide deeper insight.

Goodness of measurement scales

Qualities of a good measurement scale are as follow:

Reliability

Reliability refers to the consistency of a measure. Psychologists consider three types of consistency: over time (test-retest reliability), across items (internal consistency), and across different researchers (inter-rater reliability).

Test-Retest Reliability

When researchers measure a construct that they assume to be consistent across time, then the scores they obtain should also be consistent across time. **Test-retest reliability** is the extent to which this is actually the case. For example, intelligence is generally thought to be consistent across time. A person who is highly intelligent today will be highly intelligent next week. This means that any good measure of intelligence should produce roughly the same scores for this individual next week as it does today. Clearly, a measure that produces highly inconsistent scores over time cannot be a very good measure of a construct that is supposed to be consistent.

Internal consistency is the consistency of people's responses across the items on a multiple-item measure. In general, all the items on such measures are supposed to reflect the same underlying construct, so people's scores on those items should be correlated with each other. For example, people might make a series of bets in a simulated game of roulette as a measure of their level of risk seeking. This measure would be internally consistent to the extent that individual participants' bets were consistently high or low across trials.

Interrater Reliability

Inter-rater reliability is the extent to which different observers are consistent in their judgments. For example, if you were interested in measuring university students' social skills, you could make video recordings of them as they interacted with another student whom they are meeting for the first time. Then you could have two or more observers watch the videos and rate each student's level of social skills. To the extent that each participant does in fact have some level of social skills that can be detected by an attentive observer, different observers' ratings should be highly correlated with each other.

Validity

Validity is the extent to which the scores from a measure represent the variable they are intended to. Face validity, content validity, criterion validity and discriminant validity are the four types of validity.

Face Validity

Face validity is the extent to which a measurement method appears "on its face" to measure the construct of interest. Most people would expect a self-esteem questionnaire to include items about whether they see themselves as a person of worth and whether they think they have good qualities. So a questionnaire that included these kinds of items would have good face validity. The finger-length method of measuring self-esteem, on the other hand, seems to have nothing to do with self-esteem and therefore has poor face validity. Although face validity can be assessed quantitatively—for example, by having a large sample of people rate a measure in terms of whether it appears to measure what it is intended to—it is usually assessed informally.

Content Validity

Content validity is the extent to which a measure "covers" the construct of interest. For example, if a researcher conceptually defines test anxiety as involving both sympathetic nervous system activation (leading to nervous feelings) and negative thoughts, then his measure of test anxiety should include items about both nervous feelings and negative thoughts.
Like face validity, content validity is not usually assessed quantitatively. Instead, it is assessed by carefully checking the measurement method against the conceptual definition of the construct.

Criterion Validity

Criterion validity is the extent to which people's scores on a measure are correlated with other variables (known as **criteria**) that one would expect them to be correlated with. For example, people's scores on a new measure of test anxiety should be negatively correlated with their

performance on an important school exam. If it were found that people's scores were in fact negatively correlated with their exam performance, then this would be a piece of evidence that these scores really represent people's test anxiety. But if it were found that people scored equally well on the exam regardless of their test anxiety scores, then this would cast doubt on the validity of the measure.

Suppose a researcher develops a new measure of physical risk taking. People's scores on this measure should be correlated with their participation in "extreme" activities such as snowboarding and rock climbing, the number of speeding tickets they have received, and even the number of broken bones they have had over the years.

When the criterion is measured at the same time as the construct, criterion validity is referred to as **concurrent validity**; however, when the criterion is measured at some point in the future (after the construct has been measured), it is referred to as **predictive validity** (because scores on the measure have "predicted" a future outcome).

Criteria can also include other measures of the same construct. For example, one would expect new measures of test anxiety or physical risk taking to be positively correlated with existing measures of the same constructs. This is known as **convergent validity**.

Discriminant Validity

Discriminant validity, on the other hand, is the extent to which scores on a measure are *not* correlated with measures of variables that are conceptually distinct. For example, self-esteem is a general attitude toward the self that is fairly stable over time. It is not the same as mood, which is how good or bad one happens to be feeling right now. So people's scores on a new measure of self-esteem should not be very highly correlated with their moods. If the new measure of self-esteem were highly correlated with a measure of mood, it could be argued that the new measure is not really measuring self-esteem; it is measuring mood instead.

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Paper – 4.5: Business Research Methods

Data collection & Questionnaire design

Data collection

The task of data collection begins after a research problem has been defined and research design/plan chalked out. In simple words, data collection is the process by which the researcher collects the information needed to answer the research problem.

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes.

In collecting the data, the researcher must decide: ν Which data to collect ν How to collect the data ν Who will collect the data ν When to collect the data

Types of data - Primary data

Primary data are the data collected afresh and for the first time, and thus happen to be original in character. Such raw data is obtained directly from first hand sources by mans of surveys, observations and experimentation and are not subjected to any processing or manipulation.

(i) Advantages of primary data:

• The primary data are original and relevant to the topic of the research study so the degree of accuracy is very high.

• Primary data is that it can be collected from a number of ways like interviews, telephone surveys, focus groups etc. It can be also collected across the national borders through emails and posts. It can include a large population and wide geographical coverage.

• Moreover, primary data is current and it can better give a realistic view to the researcher about the topic under consideration.

• Reliability of primary data is very high because these are collected by the concerned and reliable party.

(ii) Disadvantages of primary data:

• For collection of primary data where interview is to be conducted the coverage is limited and for wider coverage a more number of researchers are required.

• A lot of time and efforts are required for data collection. By the time the data collected, analyzed and report is ready the problem of the research becomes very serious or out dated. So the purpose of the research may be defeated.

• It has design problems like how to design the surveys. The questions must be simple to understand and respond.

• Some respondents do not give timely responses. Sometimes, the respondents may give fake, socially acceptable and sweet answers and try to cover up the realities.

• With more people, time and efforts involvement the cost of the data collection goes high. The importance of the research may go down.

• In some primary data collection methods there is no control over the data collection. Incomplete questionnaire always give a negative impact on research.

• Trained persons are required for data collection. Inexperienced person in data collection may give inadequate data of the research.

Methods of collecting primary data

Quantitative data is in numerical terms while qualitative data is in the form of statements recorded by the researcher which cannot be expressed in numerical terms but are relevant to the current research problem.

(Primary data collection by asking people)- Communication

Surveys

Survey refers to the method of securing information concerning a phenomenon under study from all (census) or a selected number (sample survey) of respondents of the concerned universe. It involves questioning individuals on a topic or topics and then describing their responses. In business studies survey method of primary data collection is used in order to test concepts, reflect attitude of people, establish the level of customer satisfaction, conduct segmentation research and a set of other purposes.

Different survey methods include personal survey, mail survey, telephone survey, mall intercept, interviews, mail panels, computer aided personal interviews and computer aided telephone interviews.

Interviews

The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral verbal responses. Interview is the verbal conversation between two people with the objective of collecting relevant information for the purpose of research.

Types of interviews

- Personal Interview is a two way, face to face communication between an interviewer and the respondent. Generally, personal interview is carried out in a planned manner and is referred to as 'structured interview' which is most commonly used in descriptive researches. This can be done in many forms e.g. door to door or as a planned formal executive meeting.
- Unstructured interviews do not follow a system of predetermined questions and standardized techniques of recording information. They follow a flexible approach to questioning. These are useful in exploratory or formulative research studies.
- Telephone interview the information is collected from the respondent by asking him questions on the phone is called as telephone interview. The combination of telephone and computer has made this method even more popular.
- Focus group interview is an unstructured interview which involves a moderator leading a discussion between a small group of respondents on a specific topic. Attention is on the given experience of the respondent. The interviewer has the freedom to decide the manner in which questions will be asked and also explores reasons and motives.
- Clinical interview is concerned with broad underlying feelings or motivations or with the course of individual's life experience.
- Depth interview is nondirective in nature where the respondent is given freedom to answer within the boundaries of the topic of interest. The interviewer's function is simply to encourage the respondent to talk about the given topic with a bare minimum of direct questioning.

- Projective Techniques involve the presentation of an ambiguous, unstructured object, activity or person that a respondent is asked to interpret and explain. The respondents are asked to interpret the behavior of others/objects and this way they indirectly reveal their own behavior in the same situation. This is done using Word Association Test, Cloud Picture Test, Sentence Completion Test and Story Completion Study.
- Informal, conversational interview - no predetermined questions are asked, in order to remain as open and adaptable as possible to the interviewee's nature and priorities; during the interview the interviewer "goes with the flow".
- General interview guide approach - intended to ensure that the same general areas of information are collected from each interviewee; this provides more focus than the conversational approach, but still allows a degree of freedom and adaptability in getting the information from the interviewee.
- Standardized, open-ended interview - the same open-ended questions are asked to all interviewees; this approach facilitates faster interviews that can be more easily analyzed and compared.
- Closed, fixed-response interview - all interviewees are asked the same questions and asked to choose answers from among the same set of alternatives.

(Primary data collection by watching people) – Observation

Observation may be defined as systematic viewing, coupled with consideration of seen phenomenon. Observation method is a method under which data from the field is collected with the help of observation by the observer Researchers use all of their senses to examine people in natural settings or naturally occurring situations Observation is way of gathering data by watching behavior, events, or noting physical characteristics in their natural setting. Observations can be overt. (everyone knows they are being observed) or covert. (no one knows they are being observed and the observer is concealed).

Types of observation

- Structured and unstructured observation – structured observation is used when the research problem has been formulated precisely and the observers have been told specifically what is to be observed. They may be given simple form to record observations. Unstructured observation implies that observers are free to observe whatever they think is relevant and important. While structured observations are free from subjective bias, unstructured observations are subject this limitation.
- Participant & Non Participant Observation - When the Observer is member of the group which he is observing then it is Participant Observation. In participant observation researcher can record natural behavior of group experiencing what the members of the group experience. Information that is difficult to collect can be obtained easily through this method. Non Participant Observation• When the observer observes as a detached emissary without being a participant, it is known as non-participant observation.
- Disguised and undisguised observation – when the observer is observing in such a way that his presence is unknown to the people he is observing, such an observation is

described as disguised observation. The participants do not know that they are being observed. This type of observation is preferred because it is feared that people may behave differently when they know they are being observed. In **undisguised** observation, respondents are aware they are being observed.

- Natural or contrived (uncontrolled or controlled) - Natural observation involves observing behavior as it takes place in the environment, for example, eating hamburgers in a fast food outlet. In **contrived** observation, the respondents' behavior is observed in an artificial environment, for example, a food tasting session.
- Direct or indirect **–** In case of direct observation, the event or behavior of a person is observed as it occurs. In indirect observation, some record of past behavior is observed. In other words, the behavior itself is not observed, rather its effects are observed. For example, an observer interested in knowing about soft drink consumption of a household will look for empty soft drink bottles or seek permission from the housewife to see the pantry.
- Human or mechanical – Another way of classifying observations is whether they are made manually or by machines. Sometimes trained observers are required to observe and faithfully record their observations. In some cases mechanical devices (video, closed circuit television) record what is being observed. These devices may or may not require the respondent's direct participation. They are used for continuously recording on-going behavior

(Primary data collection – Experimentation)

An experiment refers to an investigation in which a factor or variable under test is isolated and its effects measured. In an experiment the investigator measures the effects of an experiment which he conducts intentionally. Experimental research provides a systematic and logical method for answering the question "What will happen if this is done when certain variables are carefully controlled or manipulated?" Data are collected from several readings of experiments. Possible relationships between the data and the unknowns in the universe are determined.

(Primary data collection – Case study method)

The case study method is a form of qualitative analysis and involves a careful and complete observation of a social unit – a person, a family, an institution or a cultural group or even the entire community. It is an in depth analysis of limited number of events or conditions and their inter relations. Thus, case study is essentially an intensive investigation of the particular unit under consideration.

Types of data - Secondary data

Secondary data are those which have already been collected by someone else and which have been already passed thru the statistical process. Common sources of secondary data for social

science include censuses, information collected by government departments, organizational records and data that was originally collected for other research purposes. Also included are technical and trade journals, books, magazines and newspapers,

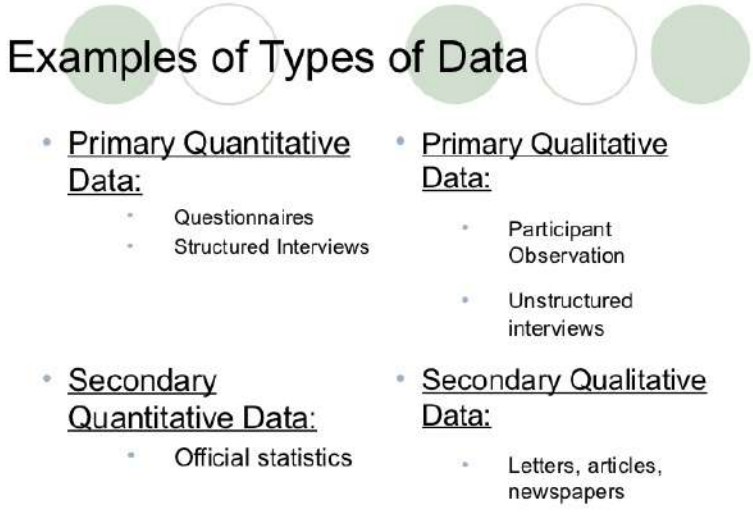
(i) Advantages of Secondary Data:

• The primary advantage of secondary data is that it is cheaper and faster to access.
• Secondly, it provides a way to access the work of the best scholars all over the world.
• Thirdly, secondary data gives a frame of mind to the researcher that in which direction he/she should go for the specific research.
• Fourthly secondary data save time, efforts and money and add to the value of the research study.

(ii) Disadvantages of Secondary data:

• The data collected by the third party may not be a reliable party so the reliability and accuracy of data go down.
• Data collected in one location may not be suitable for the other one due variable environmental factor.
• With the passage of time the data becomes obsolete and very old
• Secondary data collected can distort the results of the research. For using secondary data a special care is required to amend or modify for use.
• Secondary data can also raise issues of authenticity and copyright

Both primary data and secondary data can be qualitative and/or quantitative in nature.



The selection of data collection method should be based on the following:

- The identified hypothesis or research problem
- The research design

- The information gathered about the variables

Research instrument – it is described as a device used to collect the data that facilitates variable observation and measurement. The type of instrument used by the researcher depends on the data collection method selected. "Massey states that the "Instrument development requires a high degree of research expertise, as the instrument must be reliable and valid." Questionnaires and scales are commonly used research instruments.

Questionnaire

A questionnaire is a research instrument consisting of a series of questions for the purpose of gathering information from respondents. Questionnaire can be classified as follows:

Structured questionnaire – it I a formal list of questions framed so as to get the facts. The interviewer asks the questions in a pre-arranged order. Structured questionnaire may be (i) disguised and (ii) non disguised. In a structured disguised questionnaire, the researcher does not disclose the object of the survey. A structured non disguised questionnaire is one where the listing of questions is in a pre0-arranged order and where the object of enquiry is revealed to the respondent.

Non-structured questionnaire – it is one in which he questions are not structured and the order in which they are to be asked from the respondent is left entirely to the researcher. Thus, a non-structured questionnaire is devoid of rigidity and allows considerable freedom to the researcher in choosing the order as well as the specific contents of the questions. Where the purpose of the enquiry is disclosed to the respondents, the questionnaires are known as non-structured and non-disguised while in other cases, the questionnaires are classified as non-structured and disguised questionnaires.

Designing a questionnaire

A researcher has to decide what information is to be collected, how many questions have to be formulated, what should be their sequence, what should be the wording of each question, and what should be the layout of the questionnaire.

Type of information to be collected

Type of information to be collected may be (i) facts (owning a car) (ii) quasi facts (date of buying the car?) (iii) awareness (awareness about the product/brand) (iv) opinions (about the product/brand/ad, etc.) (v) attitudes (towards a brand/ad) (vi) future action plans (likely purchases in the next 6 months) (vii) reasons (for buying/not buying, liking/not liking, etc.)

Type of questions

Questions appearing in a questionnaire may be (i) open ended or simply 'free answer' questions which give the respondent complete freedom to decide the form, length and detail of answer. Close ended questions provide options to the respondent to choose from. (ii) Dichotomous questions having only two answers like yes/no, true/false, use/do not use, etc. (iii) Multiple choice questions in which the respondent is offered more than two choices.

Phrasing the questions

The way in which a question is drafted is very important as a slightly suggestive wording would elicit a very different answer from the respondent. For ex., the question "don't you think that this is a sub standard product?" will elicit a different response compared to the question "do you think that this is a sub standard product?" Hence, care and caution should be used in phrasing the questions. Difficult words and vague words should be avoided. Technical/special terms which respondents may not understand should be excluded. Lengthy questions should not be used and no two questions should be combined. Precision is important.

Sequence of questions

Questions of general type and simple questions must be put at the beginning of the questionnaire. questions needing in-depth information and difficult/sensitive questions should be relegated to the end of the questionnaire. Care should be taken to sustain the interest of the respondent until the last so that he is able to answer specialized questions in a normal manner without fatigue and indifference. Going from general to specific is known as funnel approach. Funnel approach is a strategy for ordering questions in a questionnaire in which the sequence starts with general questions that are followed by progressively specific questions in order to prevent specific questions from biasing general questions. Questions should be in logical order. All the questions dealing with a particular topic should b asked before beginning a new topic. Transitional phrases should be used to switch topics. Branching questions that direct respondents to other different question in the questionnaire should be designed carefully.

Number of questions

The researcher has to decide the number of questions considering the time required to answer the questionnaire. He has to sustain the interest of the respondent until the last moment so that the interview can be completed successfully and the requisite information obtained. Too lengthy a questionnaire would be a disadvantage and the response to it may be quite poor. The questionnaire may be pre tested with friends and family members before finalizing.

Layout of the questionnaire

The questionnaire document must be set in such a way that it leaves a favorable impression on the respondent. It should be neatly printed and the individual pages should not have too many questions so as to look crowded. Proper spacing within a question and between questions should be provided. The most important wordings to which the researcher would like to draw attention

of the respondent, should be set in bold type or underlined. The questionnaire should look good and be printed on a fine quality of paper so that writing with pen or pencil is smooth.

Mail questionnaires

Mail questionnaires should be shorter than the questionnaires to be used personally otherwise the response rate would be affected adversely. In case a lengthy mail questionnaire is to be used, it may be desirable to send an advance letter, seeking the cooperation of the respondent. This may increase the response rate. A covering letter explaining the purpose and importance of the survey should be enclosed. It should be accompanied by pre-addressed and stamped envelope to facilitate the respondent to return the same as soon as it I filled in without incurring any expenditure himself.

Essentials of a good questionnaire

- The size of the questionnaire should be kept to the minimum.
- Questions should proceed in logical sequence moving from easy to more difficult questions. Personal and intimate questions should be left to the end.
- Technical terms and vague expressions capable of different interpretations should be avoided in a questionnaire. Questions affecting the sentiments of respondents should also be avoided.
- Brief directions for filling the questionnaire are quite helpful in getting complete responses.
- A pilot study should be undertaken for pre-testing the questionnaire.

Report writing

Research Report is a formal statement (written/oral) of the research process, its results, recommendations and/or conclusions to a specific audience. It is a channel to communicate the research findings to the concerned people. It narrates the problem studied, methods used for studying it and the findings and conclusions of the study.

It is extremely important because research is an intangible process (no physical evidence); written report is the only documentation and the only aspect that managers are exposed to. Report is the tangible product of research offer. Overall evaluation of research process is based on effective communication about it to the managers. Management's decision to undertake marketing research in future or to use the particular research supplier again will be influenced by the perceived usefulness of the report and the presentation.

Oral and written reports

An oral report is any presentation of information thru the spoken word. A written report is presentation of information in written/printed document form. Research reports are mostly written ones which are sometimes supported by oral presentation as well. While making an oral presentation, the researcher should (i) know the audience and if h has to inform them or persuade them (ii) divide the matter into meaningful and comparable parts (iii) present logically in simple language and in a convincing manner using visual aids such as charts, diagrams, tables, pictures, posters, blackboards, slides and movies. Statistical data or charts may be distributed as handouts prior to the presentation.

A written report is bound to receive considerable attention and scrutiny. Whenever a certain point is not clear in a written report the reader can read it again and again slowly and carefully.

The report preparation and presentation process

The process begins by interpreting the results of data analysis in light of the research problem, approach, research design, and fieldwork. Instead of merely summarizing the statistical results, the researcher should present the findings in such a way that they can be used directly a input into decision making. Wherever appropriate, conclusions should be drawn and actionable recommendations must be made. Before writing the report, the researcher should discuss the major findings, conclusions, and recommendations with the key decision makers.

The entire research project should be summarized in a single written report or in several reports addressed to different readers. Generally, an oral presentation supplements the written reports. After that the researcher should take necessary follow-up actions.

Steps in writing reports

- *Logical analysis of the subject matter:* This step is primarily concerned with the development of a subject. Subject may be developed (a) logically (b) chronologically. The logical development is made on the basis of mental connections and associations between the one thing and another by means of analysis. Logical treatment often consists in developing he material from the simple possible to the most complex structures. Chronological development is based on a connection or sequence in time or occurrence.

- *Preparation of final outline:* Outlines are the framework upon which long written works are constructed. They are an aid to the logical organization of the material and a reminder of the points to be stressed in the report.

- *Preparation of rough draft:* The researcher writes down the procedure adopted by him in collecting the material for his study along with various limitations faced by him, the technique of analysis adopted by him, the broad findings and generalizations and the various suggestions he wants to offer regarding the problem concerned.

- *Rewriting and polishing of rough draft:* This step requires more time than writing the rough draft. The careful revision makes the difference between a mediocre and a good piece of writing. While rewriting and polishing, one should check the report for weaknesses in logical development or presentation. The researcher should also (i) whether or not the material, as it is presented, has unity and cohesion (ii) the report stands upright and firm and exhibits a definite pattern. The researcher should also check if the rough draft is consistent or not. He should check the mechanics of writing – grammar, spelling and usage.

- *Preparation of final bibliography*: Bibliography is a list of books pertinent to the research which has been done. It should contain all the works which the researcher has consulted.

It should be arranged alphabetically. The entries in bibliography should give details like name of the author, title, publisher, volume, date of issue, pagination, etc.

- *Writing the final draft*: The final draft should be written in a concise and objective style and in simple language. The researcher must avoid abstract terminology and technical jargon. A report draft should be original, maintain interest and enthuse people. Every research report should be an attempt to solve some intellectual problem and must contribute to the solution of a problem and must add to the knowledge of both the researcher and the reader.

Layout/Format of research report

Report format are likely to vary with the researcher doing the study, the client for whom the study is undertaken and the nature of the study itself. Most formal research reports include most of the following elements.

- *Title page* – should include the title of the report, information about the researcher or organization conducting the research, name of the client for whom the report was prepared, and the date of release.
- *Letter of transmittal* – that delivers the report to the client and summarizes the researcher's overall experience with the project, without mentioning the findings. The letter should also identify the need for further action on the part of the client, such as implementation of the findings or further research that should be undertaken.
- *Letter of authorization* – written by the client to the researcher before the work on the project begins. It authorizes the researcher to proceed with the project and specifies its scope and the terms of contract. Sometimes, letter of authorization may be included in the letter f transmittal itself.
- *Table of contents* – should list the topics covered and the appropriate page number. This table of contents is followed by List of tables, List of graphs, list of appendices and List of exhibits.
- *Executive summary* – should concisely describe the problem, approach, and the research design that was adopted, major results, conclusions and recommendations.
- *Introduction* – to the project undertaken; the major problem and its significance.
- *Problem definition* – background, problem and objectives; discussions held with decision makers and experts, secondary data analysis and qualitative research undertaken.

- *Methodology/ Research design* – should describe the type of research, information needed, data collection from primary and secondary sources, sampling, scaling techniques, questionnaire development and pre-testing, the field work and the statistical techniques and tools used.
- *Limitations* – caused by time, budget and other organizational constraints; possible errors.
- *Data analysis* – plan of data analysis justifying the strategy and techniques used described in simple, non technical terms.
- *Results/Findings* - should be organized in a coherent and logical way. The results should be presented at the aggregate level as well as at the sub group level. The details should be presented in tables and graphs, with the main findings discussed in the text.
- *Conclusions and suggestions/recommendations* – in the light of the problem addressed and the results obtained. If suggestions are made, they should be feasible, practical, actionable and directly usable as inputs into managerial decision making.
- *Appendices, Bibliography* – this is the last section of the report. An appendix gives supplementary information which supports the body of the report but which cannot be given within it. Generally, large and complex statistical tables, technical notes, copies of questionnaires used, instructions to field staff and any other material used as supporting evidence for the write up in the report are given in the form of appendices.

  Most of the research reports also contain a bibliography, showing the title of the books/report used in their presentation, names of author, publishers, the year of publication and, if possible, the page numbers. Similar information is given in respect of articles/papers. The bibliography should be arranged in alphabetical order.

Essentials of a good report

- *Size and physical design* – The manuscript should be written on unruled paper. A margin of at least one and one-half inches should be allowed at the left hand and of at least half an inch at the right hand of the paper. There should also be one-inch margins, top and bottom. The paper should be neat and legible. If the manuscript is to be typed, then all typing should be double spaced on one side of the page only except for the insertion of long quotations.
- *Procedure* – Various steps in writing the report should be strictly adhered.
- *Layout* – Keeping in view the objective and nature of the problem, the layout of the report should be thought of and decided and accordingly adopted.

- *Treatment of quotations* – Quotations should be placed in quotation marks and double spaced, forming an immediate part of the text. But if a quotation is lengthy, then it should be single-spaced and indented at least half an inch to the right of the normal text margin.
- *The footnotes* – Footnotes are placed at the bottom of a page on which the reference or quotation which they identify or supplement ends. Footnotes are separated from the main text by a space of half an inch and a line about one and half inches long. Footnotes should be numbered consecutively, usually beginning with 1 in each chapter separately. The number should be put slightly above the line. At the footnote of the page, again, the footnote number should be indented and typed a little above the line. Thus, consecutive numbers should be used to correlate the reference in the text with its corresponding note at the bottom of the page, except in case of statistical tables and other numerical material, where symbols such as * or the like may be used to avoid confusion. Footnotes are always typed in single space though they are divided from one another by double space.
- *Documentation style* – regarding documentation, the first footnote reference to any given work should be complete in its documentation, giving all the essential facts about the edition used.
- *Use of statistics, charts and graphs* – Judicious use of statistics (presented in the form of tables, charts, bars and line graphs and pictograms) in research reports is often considered a virtue for it contributes a great deal towards the clarification and simplification of the material and research results. Such statistical presentation should be neat, attractive, self explanatory, appropriate and complete in itself.
- *The final draft* – Revising and rewriting the rough draft of the report should be done with great care before writing the final draft.