



# *Course Material*

**QM-503: Research Methods for Management**

**For**

**Post Graduate Diploma in Management (Working  
Executive) Course**

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## FOREWORD

Designing a course material is no easy task, not even when you have been teaching for more than 15 years. It is always a work in progress. New and newer material needs to be added, document needs to be checked for errors, typesetting needs to be done. And all of this has to be done while doing your regular job of copy correction, classroom teaching and facing AICTE inspections.

However, no course material would have been possible without cohorts of experimental subjects called students; subject to misery and torture of a classroom setting – while their minds were miles away from classroom. As you can see, this course material is a work in progress. Many chapters are in slide form and need to be converted to textual form. Hopefully, someday soon, it will be converted into a book.

I am sure that while going through the course material you may find errors and issues. **I shall be grateful if you could find some time to share the errors and issues** with me via email [rohitvishalkumar@gmail.com](mailto:rohitvishalkumar@gmail.com). Your feedback would be much appreciated and it would go on to benefit other students in the future.

I would like to thank INTERNATIONAL MANAGEMENT INSTITUTE, Bhubaneswar and this PGDM-WE program without which the thought of cohesively collecting the materials would not have occurred to me. Thanks are also due to you – the students and participants – who sat patiently through my classes. Also my family deserves a big mention for bearing with me through thick and thin.

Dated: July 7, 2019

**Dr. Rohit Vishal Kumar**



**Research Methods for Management (QM-503)**

**Full Credit (2 credits) course for PGDM-WE**

**Session Duration: 90 Minutes per session**

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**COURSE INTRODUCTION**

Management is a restless, dynamic and changing field. Since the 1920's many important and dramatic changes have taken place in all fields of management. Thousands of new products, hundreds of new ideas, tools and techniques have appeared in the field of management – some to stay and some to shine for a few months only. Concomitant with such broad and sweeping changes in the environment are the gradual but pronounced shifts in the organizational focus from production to marketing; from marketing to customer relationship; from customer relationship to employee and from employee to data driven decision making. The management executives today are saddled with a wider range of responsibilities that have grown in complexity and an ever-increasing premium is being placed on sound decision making.

Under such a scenario there is a growing demand for formalized means of acquiring information to assist in making of such decisions. The tools and techniques of data collection for sound decision making form the crux of the course of Research Methodology. In other words, the goal of Research Methodology course is to teach the participants how research is being done, and to put that knowledge into practice.

**LEARNING OBJECTIVES:**

The learning objectives of the course are as follows:

Learning Objectives	Learning Outcomes
<b>L01</b> Subject Knowledge	<ul style="list-style-type: none"><li>To make the students familiar with the “knowledge of theory and practices” in Research Methodology so that they can apply the methodologies to solve business problems</li></ul>
<b>L02</b> Knowledge Application	<ul style="list-style-type: none"><li>To be able to use the knowledge of Research Methodology theory and practices to business problems for providing solutions for creating and enhancing customer value</li></ul>
<b>L03</b> Critical Thinking	<ul style="list-style-type: none"><li>To be able to develop and use Analytical and critical thinking to process available information for providing practical business solutions in the business domain</li></ul>

<b>L04</b> Teamwork & Communication	<ul style="list-style-type: none"> <li>To be able to work jointly to execute a proper research project in diverse domains and convey the results to the management for attainment of organizational goals</li> </ul>
<b>L05</b> Responsible Business	<ul style="list-style-type: none"> <li>To be able to understand the <i>ethical, environmental, sustainability and socio-cultural dimensions</i> in the context of Research Methodology</li> </ul>
<b>L06</b> International Perspective	<ul style="list-style-type: none"> <li>To be able to understand and extrapolate the learnings in Research Methodology and apply it in a global context.</li> </ul>

#### **COURSE PEDAGOGY:**

The teaching methodology will be a combination of classroom lectures which should encourage active participation, discussions, and debates. Research Methods for Management is a hands-on course designed to impart education in the foundational methods and techniques of research in social sciences and business management. Students would be exposed to various aspects of research framework i.e., problem definition, research design, data collection, report writing, and the likes. Once equipped with this knowledge, participants would be well placed to conduct disciplined research in an area of their choosing. Learning will further be reinforced by quizzes, assignment questions on cases, and a final examination.

#### **COURSE READINGS**

The following books are being referred for the course. However, it is expected that the participants will make use of other materials which will be prescribed from time to time. Students are advised to read newspapers and business magazines of their choice on a regular basis to augment the classroom learning.

1. Malhotra, N. K. (2015). *Marketing Research - An Applied Orientation* (7th ed.). New Delhi: Pearson Education India.
2. Chawla, D., & Sondhi, N. (2016). *Research Methodology - Concepts and Cases* (2nd ed.). Noida, India: Vikas Publications.
3. Zikmund, W. G., Babin, B. J., Carr, J. C., Adhikari, A., & Griffin, M. (2016). *Business Research Methods - A South Asian Perspective* (4th Indian Reprint ed.). Patparganj India: Cengage Learning India Pvt Ltd.

The above books would constitute essential reading for the course. However, the classroom lecture would be augmented by examples and discussions. **The key readings and cases** are provided in the reading material. The instructor would be deciding on discussion schedules

#### **COURSE EVALUATION CRITERIA:**

The evaluation process for the course would constitute of the following:

<b>Component</b>	<b>Weightage</b>	<b>Duration</b>	<b>Key Objectives Tested</b>
Class Participation	10%	Continuous	L01 L02 L03 L04
Class Quiz	20%	15 minutes	L01 L02
Group Assignment	30%	Trimester	L01 L02 L03 L04
End Trimester	40%	2½ Hours	L01 L02 L03 L04 L05 L06

**Class Participation:** The students would be judged on their ability to discuss the lessons and to discuss practical aspects during the class. Marks would be allotted basis of argumentation skills and convincing skills with respect to the discussion

**Class Quiz:** A paper and pen based (or computer based) test would be conducted by the instructor during the course for 20 marks. The objective is to ensure a learning so that participants can refresh their knowledge on the go. It would be held twice during the term

**Group Assignment (Report):** The participants will have to conduct a primary study on a topic of their choice and submit a report of the same along with presentation of the same. The assignment may require design of questionnaire, data collection and analysis to ensure that concepts are well understood. The “*Measurement and Scales used*”, and the “*Overall questionnaire design*” would be evaluated for 5% of the total marks respectively. The report will be evaluated for 20%

It should be further be noted that:

1. The maximum word limit for the assignment will be 3000 words +/- 10% (excluding annexure)
2. The assignment must be an original work and part II should be strictly primary research based
3. Citations should be properly provided using APA style

#### SESSION PLAN:

The following session plan would be adhered to by the faculty:

Session	Topic to be covered	Learning Objective	Additional Notes
1.	<b>Introduction to Business Research</b> <i>The nature of business research, managerial value of business research, when is business research needed, Business Research in 21<sup>st</sup> Century</i>	L01 L05	
2.	<b>Theory Building</b> <i>What is theory? What are the goals of theory? Research Concepts, constructs, propositions and hypothesis, verifying theory, Building Theory</i>	L01 L02	
3.	<b>An overview of Business Research Process</b> <i>Introduction, Decision Making, Types of Business Research – Exploratory, Descriptive and Causal, Defining the research process, defining research objectives, Planning the research design</i>	L01 L02 L04	Case 9.1 (Reading Notes) – “ <i>ITC e-choupal</i> ”
4.	<b>Problem Definition</b> <i>Importance of starting with a good problem definition, Problem Complexity, Problems means gaps, identifying relevant issues, Determining the units of analysis, determining the relevant variables, Writing hypothesis, The proposal as a contact and planning tool</i>	L01 L03	Case 9.2 (Reading Notes) – “ <i>E-ZPass</i> ”

5.	<b>Qualitative Research Tools</b> <i>What is qualitative research? Qualitative versus Quantitative Research, Basic introduction to Phenomenology, Ethnography, Grounded Theory, Focus Group Discussion, Depth Interviews, Association techniques etc.</i>	L01 L02 L03 L05	Case 9.3 (Reading Notes) – <b>“Twilight Luxury: Retirement Solutions”</b>
6.	<b>Survey Research</b> <i>Using Survey Research, Errors in Survey Research – Random Sampling, Systematic, Response, Administrative, etc. What to do about errors in Survey Research, Personal Interviews, Door to Door Interviews, Phone Interviews, CAPI and CATI, Mail Questionnaires, Pretesting, Issues in Survey Research</i>	L01 L02 L03 L05	Case 9.4 (Reading Notes) – <b>“The Royal Bee Electric Fishing Reel”</b>
7.	<b>Experimental Research</b> <i>Causality, Cause and Effect Relationships, Creating an experiment, Types of experimental designs, Issues in Experimental validity – internal and external</i>	L01 L02 L03	Convert the Case 9.4 - <b>“The Royal Bee Electric Fishing Reel”</b> into an experimental research design
8.	<b>Measurement and Scaling Concepts</b> <i>What to measure, Types of measurement scales, Criteria for a good scale, Introduction to various kinds of scales</i>	L01 L02 L03	5% weightage for scales used in the research report
9.	<b>Questionnaire Design</b> <i>Basic Considerations, Wording Issues, Types of Questions, Guidelines for constructing Questionnaire, Sequencing of Questions, Administering Questionnaires</i>	L01 L02 L03 L05	5% weightage for scales used in the research report
10.	<b>Sampling Design and Procedures</b> <i>Why sampling is required, types of sampling techniques – Random Sampling versus Non-Random Sampling Techniques, Sampling units, Determination of sample size, Handling non-response</i>	L01 L02 L03 L05	Case 9.5 (Reading Notes) – <b>“RAP Food Stores”</b>
11.	<b>Analysis of Data – Basic Introduction</b> <i>Basic Descriptive Statistics, Data tabulation and calculations, Hypothesis testing, Type I and Type II error</i>	L01 L02	
12.	<b>Doubt Clearing &amp; Revision Session</b>		

## INTRODUCTION TO RESEARCH

*Research* connotes a systematic and objective investigation of a subject or a problem in order to discover relevant information and principles. It can be considered to be of two types: (a) *Fundamental Research*: frequently called the pure or basic research, seeks to expand the boundaries of knowledge in a given area, with no necessary immediate application to existing problem and (b) *Applied Research*: also known as decisional research attempts to use the existing knowledge as an aid to solution of some given problem or set of problems. For example: When scientist develop the theory of nuclear fission it is the development of fundamental research; but when they use the theory to develop hydrogen bomb then it is known as applied research. In simple terms research can be defined as:

Research is the systematic and objective search for and analysis of information relevant to the identification and solution of any problem in a given field.

### 1.1 Features of Research

From the above definition, the following four features of research are clearly discernable:

1. **Systematic**: Research is systematic in nature. Careful planning at all stages of research is important. Starting with a clear and concise statement of the problem to be researched, good research practise requires that the information sought, the methods used in obtaining it, and the analytical techniques to be employed be systematically and carefully laid out in advance if possible.
2. **Objective**: Objectivity in research is all important. The heart of research is objective gathering and analysis of information. Research projects which are done with the purpose of “proving” a prior opinion are a waste of time.

Research done with such underlying motive are “*pseudoresearch*”. This is a serious breach of research ethics.

3. **Problem in a Given Field:** The research is carried out with a specific problem in mind and the problem cannot be changed or modified during the research process. The research problem can be as thorough as required but once it is decided it cannot be changed. It is always desirable to have the research problem in as specific terms as possible. Vague and unspecified research problems are not desirable.
4. **Search for Information:** The search for information plays an important part in providing the solution to the research problem. However, it should be noted that the search for information can never be 100% accurate as it is limited by many factors. Thus research aims at providing solutions which have the least error. Research solutions are not guaranteed to be error-free.

## 1.2 Research in Practice

Very broadly, the functions of research can be classified as *description*, *explanation*, *evaluation* and *prediction*. Research – especially applied research – can be looked upon as an aid to making a decision. It should not be confused with decision.

Research is based on information. Information is defined as “a recorded experience that is useful for decision making”. In other words it can be seen as a recorded experience which can help in reducing the level of uncertainty associated with making a decision. As such we can see that the research problem itself specifies the kind of information which is required for solution to a problem. For better solution to a problem the information which is gathered should be accurate, current, sufficient, available and relevant.

## 1.3 Research Proposal

A research proposal is a written document, which outlines the plan of the research study. Research proposal is written before the research project is started. A well written research proposal helps the researcher get a clear and precise view of what she intends to do, how she actually intends to conduct the research work, how much time will it take, what expenses would be incurred and how she will monitor the progress of work. It is, in fact, a mandatory requirement in academics whenever a student wants to go in for higher studies which involves research.

In social sector, funding agencies and sponsors of project usually allocated funds for research work on a competitive basis. They go through the submitted research proposals to judge the relevance and significance of the study as well as the researcher’s competency for conducting such a research project. On accep-

tance of the project for funding, the research proposal becomes the contract on the basis of which the research is evaluated and monitored.



Figure 1.1: Corporate Agency Research Proposal Interaction

In the corporate sector, a research proposal is usually written by the research agency when it receives the “Research Brief” from the client organisation. The “Research Brief” does not have any well defined format and is usually the managerial problem on which the client organisation wants to conduct the research. On receiving the research brief, the research agency responds with a research proposal. This is then evaluated by the client for time and cost considerations, and on acceptance of the research proposal the contract for research is given. The research proposal of the corporate sector is unique in the sense that it also has a section on Cost and Payment Terms – which specify how the money is to be paid to the agency by the client. Normally agencies ask for 25% payment on commissioning of the research, remaining 50% on completing fieldwork and the remaining 25% on presentation of report. Here also, the research proposal becomes the benchmark for evaluating the progress of the research.

## 1.4 Major Sections of a Research Proposal

Any research proposal consists of various parts. The parts are discussed below. It should be remembered, that as per the requirements of the corporate sector, social sector or academics, some parts may be more important than others; some parts may be excluded or included; but the basic outline remains the same for all the sectors.

### Background of the Problem

This section of the research proposal explains how the proposed research builds upon what has already been done in an area. The background material should

strengthen the investigator's arguments concerning the significance of the study, and should orient the readers to what is already known about the problem and how the proposed research will increase the knowledge. If possible, this section should have discussion of some selective studies which are related or similar to what the researcher proposes to study. A well integrated, thoughtful and critical review should be given. Details of related literature reviewed needs to be given in the annexure.<sup>1</sup>

### **Statement of the Problem**

The problem which the investigator wants to study needs to be stated clearly and concisely. The statement should clearly indicate the key variables in the study, specify the nature of the population being studied and suggest the possibility of empirical (hypothesis) testing.

### **Objectives of the Study**

In this section the investigator should state clearly the goals that she wishes to achieve through the research. Any research study can have more than one goal. It is suggested that any research should not have more than 3–4 goals. This is because as the number of goals increases, the complexity of managing the research also increases exponentially. The specific objectives which will be undertaken for achievement of the goals should also be clearly stated. The objectives should be stated in clear and measurable terms and should form the basis of specific questions that would be asked to the respondents.

### **Assumptions**

An Assumption is a statement whose truth is either considered self-evident or has been satisfactorily established by earlier research. This acts as the basis for the current research. Normally, in this section, the researcher states the exogenous variables and their state of nature which is taken to be constant for the duration of the research. If need be, some limitations can also be included in this section.

### **Conceptual Framework**

In this section, the researcher explains the framework of concepts on which the problem is linked. The framework should also explain the relationships among the phenomenon under investigation. Normally, in commercial research, this section is omitted; whereas in academic research it is extremely important and is dealt with as a separate chapter.

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<sup>1</sup>In academic research proposal, this section is usually called the “Review of Literature”

## **Hypothesis**

Hypothesis is an assertion (or an assumption) about the state of nature which is tested for possible rejection. Hypothesis is normally required in quantitative studies and should be clearly stated. It is preferable to state hypothesis in statistical notation of null ( $H_0$ ) hypothesis. Hypothesis brings clarity to research and allows for choosing the course of action from the several available. In any research, there can be more than one hypothesis which needs to be tested.

For example, the management of a company believes that attrition rate is 10%. Then, this can be considered as a hypothesis. If the hypothesis is accepted that means that the belief of the management is correct. If for example, the hypothesis is rejected then this means the belief of the management is incorrect and further research may be required to determine the level of attrition. If level of attrition is more than (>) 10% then we have to suggest methods of controlling level of attrition. If the attrition rate is less than (<) 10% then we may need to identify factors which have contributed to the low attrition level and further can those factors be exploited by the management for the benefit of the company.

## **Research Methodology**

In this section, the overall framework of conducting the research is provided. It should clearly and concisely explain the following aspects:

- Selection of Research Methodology
- Selection of Research Design
- Population, Sample Size, Sample and Sampling Techniques
- Selection and Development of the study instruments (questionnaires etc.), including reliability and validity test's that have been conducted or will be conducted on the study instrument.
- Results of Pilot Survey (if any)
- Plan for Data Collection
- Plan for Data Analysis

Each of the above items should be explained clearly and in some detail. If possible, the work plan should also be provided. Work Plan gives the plan and the time frame in which each aspect of the study is expected to be completed by the researcher.

## **Budget**

This section deals with the Financial Aspects of the research. The complete cost — inclusive of all taxes etc. — should be presented. Normally the budget should be presented in terms of money, but material and manpower requirements can be included in the budget.

This section is not needed for a research proposal of a student.

## **Ethical Considerations**

In this section, the various ethical considerations need to be highlighted. One major ethical consideration is that the name and contact details of the respondent **should not be shared** with the client. Many organisations conduct research to collect information about the respondents and then after the research is completed, harass the respondent with marketing calls. This needs to be avoided. Simply put, respondent's confidentiality needs to be respected. If there is need to pass the details to the client, then the prior permission of the respondent needs to be taken.

The researcher should take care to highlight any other ethical consideration that may be important from the researcher's perspective.

## **References and Appendixes**

This is the final section of the research proposal. Any matter which is important but does not belong to the main body of the research proposal should be relegated to the appendix. For example, suppose we are using a statistical technique in the analysis and we feel that it is important enough to include in the proposal; then the discussion of the statistical technique should be given in the appendix. Similarly, art-work, display, questionnaire and other such material should be kept in the appendix.

In the reference section, all the published or unpublished works consulted should be listed down, preferably, using a particular citation style. There are numerous citation styles and you can choose any one with which you are comfortable. However, whichever style you use, use it consistently through out the document. It is recommended to use the APA style of citation.

## **1.5 In the End**

A well written out research proposal acts as a guide map for the researcher and the client by bringing in clarity and transparency in the whole research process. It also becomes a bench-mark which can be used to judge the clarity of work. For most people who are beginning their career in research, a research proposal looks like a waste of time, but a well researched and written proposal is half the work done. After the proposal has been approved, all the researcher needs to do is to implement the research proposal to complete the study.

## SOURCES OF DATA IN RESEARCH

### 2.1 Introduction

There are five major sources of information in marketing research. They are (i) Primary Data (ii) Secondary Data (iii) Information from Respondent (iv) Experimentation and (v) Simulation.

### 2.2 Primary Data

Primary data, also known as raw data, is data (e.g., numbers, instrument readings, figures, etc.) collected from a source with a specific research purpose in mind. If a scientist sets up a computerized thermometer which records the temperature of a chemical mixture in a test tube every minute, the list of temperature readings for every minute, as printed out on a spreadsheet or viewed on a computer screen is “raw data”. Raw data has not been subjected to processing, “cleaning” by researchers to remove outliers, obvious instrument reading errors or data entry errors, or any analysis (e.g., determining central tendency aspects such as the average or median result). As well, raw data has not been subject to any other manipulation by a software program or a human researcher, analyst or technician. It is also referred to as primary data. Raw data is a relative term (see data), because even once raw data has been “cleaned” and processed by one team of researchers, another team may consider this processed data to be “raw data” for another stage of research. Raw data can be inputted to a computer program or used in manual procedures such as analyzing statistics from a survey.

Primary data has two ways of being created or generated. The first is what is called “captured data”, and is found through purposeful investigation or analysis. The second is called “exhaust data”, and is gathered usually by machines or terminals as a secondary function. For example, cash registers, smart-phones, and speedometers serve a main function but may collect data as a secondary task. Exhaust data is usually too large or of little use to process.

For example, a point-of-sale terminal (POS terminal, a computerized cash register) in a busy supermarket collects huge volumes of raw data each day about customers' purchases. However, this list of grocery items and their prices and the time and date of purchase does not yield much information until it is processed. Once processed and analyzed by a software program or even by a researcher using a pen and paper and a calculator, this raw data may indicate the particular items that each customer buys, when they buy them, and at what price; as well, an analyst or manager could calculate the average total sales per customer or the average expenditure per day of the week by hour. This processed and analyzed data provides information for the manager, that the manager could then use to help her determine, for example, how many cashiers to hire and at what times. Such information could then become data for further processing, for example as part of a predictive marketing campaign. As a result of processing, raw data sometimes ends up being put in a database, which enables the raw data to become accessible for further processing and analysis in any number of different ways.

## **2.3 Secondary Data**

Secondary data refers to data that was collected by someone other than the user. 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. Primary data, by contrast, are collected by the investigator conducting the research. Secondary data analysis can save time that would otherwise be spent collecting data and, particularly in the case of quantitative data, can provide larger and higher-quality databases that would be unfeasible for any individual researcher to collect on their own. In addition, analysts of social and economic change consider secondary data essential, since it is impossible to conduct a new survey that can adequately capture past change and/or developments. However, secondary data analysis can be less useful in marketing research, as data may be outdated or inaccurate.

### **Administrative Data & Census**

Government departments and agencies routinely collect information when registering people or carrying out transactions, or for record keeping — usually when delivering a service. This information is called administrative data. It can include: personal information such as names, dates of birth, addresses, information about schools and educational achievements, information about health, information about criminal convictions or prison sentences tax records, such as income.

A census is the procedure of systematically acquiring and recording information about the members of a given population. It is a regularly occurring and official count of a particular population. It is a type of administrative data, but it is collected for the purpose of research at specific intervals. Most administrative

data is collected continuously and for the purpose of delivering a service to the people.

### **Advantages and disadvantages**

Secondary data is available from other sources and may already have been used in previous research, making it easier to carry out further research. It is time-saving and cost-efficient: the data was collected by someone other than the researcher. Administrative data and census data may cover both larger and much smaller samples of the population in detail. Information collected by the government will also cover parts of the population that may be less likely to respond to the census (in countries where this is optional).

A clear benefit of using secondary data is that much of the background work needed has already been carried out, such as literature reviews or case studies. The data may have been used in published texts and statistics elsewhere, and the data could already be promoted in the media or bring in useful personal contacts. Secondary data generally have a pre-established degree of validity and reliability which need not be re-examined by the researcher who is re-using such data. Secondary data can provide a baseline for primary research to compare the collected primary data results to and it can also be helpful in research design.

However, secondary data can present problems, too. The data may be out of date or inaccurate. If using data collected for different research purposes, it may not cover those samples of the population researchers want to examine, or not in sufficient detail. Administrative data, which is not originally collected for research, may not be available in the usual research formats or may be difficult to get access to.

## **2.4 Information from Respondents**

A major source of information in market research is that obtained from the respondents. Asking questions and observing behaviors are the primary means of obtaining information whenever people's actions are being predicted or investigated. The term respondent means - "one who responds or provides the answers". For purpose of collecting information it is useful to include both verbal and behavioral responses to define the term **answer**.

### **Sources of Information**

#### **Information from Communication**

Information can be gathered from the respondents in various ways by communicating with them. One of the most widely used device is **surveys** — in which a group of people are asked questions and the people respond to the questions. Per-

sonal interviews, telephonic interviews, mail questionnaires etc. all form a part of surveys.

Questioning a respondent is virtually a necessity if one wants to obtain information about the level of knowledge, attitude, opinion, motivation or intended behavior. Although questioning of respondents is often the most efficient and economical way to obtain the information, it requires considerable skill and care in recording, analysis and deduction to be of maximum value. In the best case scenario, people respond with correct information that they are able to provide. In the worst case scenario, the information provided may be misleading or highly biased or even completely inaccurate.

### **Information from Observation**

Relevant information from many marketing problems may be obtained by observing either present behavior or the result of a past behavior. Observation methods make it possible to record behavior as it occurs and thus eliminate errors arising from the reporting of the behavior. However observing people's behavior cannot be used effectively to obtain information about the level of knowledge, opinion, motivation or intended behavior of the respondent. Information from observation fails completely if the behavior under study is extremely private or impossible to record.

### **Types of Information**

All marketing decisions involve recognition of alternatives and making predictions. Making prediction always involves making a prediction about the behavior of participants of the market. From a respondent two broad type of information can be drawn - behavioral correlates and non behavioral correlates. They can be broadly classified as follows:

Information from the respondent

- |
- |-> Behavioral Correlates
  - | |
  - | |-> (a) Past Behavior
  - | |-> (b) Intended Behavior
- |
- |-> Non Behavioral Correlates
  - |
  - |-> (c) Socio Economic Characteristics
  - |-> (d) Information on Extent of Knowledge
  - |-> (e) Information on Attitudes and opinions

### **Past Behavior**

Past behavior is the type of information that has wide usage as a predictor of future behavior. Each of us rely heavily on it in our daily lives. For example when we say that “Ms. X is a impulsive shopper” what we really mean is that in the past we have seen Ms. X to purchase things on impulse (study of past behavior) and based on that behavior pattern we can conclude that the next time Ms. X goes shopping - she will purchase things on impulse (prediction).

In a more formal application, the use of trends, seasonal and cyclical data for forecasting are all examples of the use of recorded information of past behavior to predict future behavior. Regardless of the nature of the variables to be forecasted, a basic premise involved in these kinds of prediction is the assumption that the relationship between past and future behaviors is somewhat stable. This relationship may either be explicit or implicit, may or may not be easily identified or measured; but the researcher none the less must believe that there is some continuity and stability in the behavioral pattern of the people. to believe otherwise would make impossible the use of prediction.

The record of past behavior may have to be obtained from natural situation or controlled experiments. The assumption that there is a continuous and a relatively stable relationship between past and future behavior is basic to and is explicitly recognized in controlled experiments in marketing.

Test marketing operations are carried out to obtain information on customers and/or obtain competitors responses to various stimuli. This recorded information is used to predict future behavior, even though in many cases allowances must be made for expected changes in the condition. A formal classification of types of information with respect to past behavior is concerned with three categories - acquisition, use and possession. Within each of these areas information on “what, how much, how, where, when why and who” becomes useful for understanding consumption patterns for the product. The requirements of a particular study will dictate which of these type of information would be required.

### **Intended Behavior**

Intention may be defined as presently planned action(s) to be taken in a specified future period. Intentions, in essence, are self prediction of future behavior. Thus if intentions are obtained directly from the segment whose behavior we want to predict, it would be a more reliable and direct method of prediction

Intentions are relevant and commonly sought type of information in marketing research. However considerations of our own experience in terms of what we have planned to do vis-a-vis what we actually did, should serve to raise some questions about the reliability of intentions as a predictive tool. The question “what will you do?” must always be answered conditionally. The degree of assurance that can be given that a planned action will be translated into actual action varies widely —

depending on circumstances, future happenings etc. — many of which are outside the control of the respondent.

Many judgments and expectations are bound up in a currently valid statement of intention to buy. Variables such as expected change in financial status, price expectations, general business forecast etc. all contribute to the final intention decision. As each of these — to some extent — are random variables; it seems plausible to assume that the stated intention is based on probabilistic terms. This supposition is supported by the fact that when intention measurement data when assigned probabilities have generally proved to be more effective and accurate than any other form. The most used scale is as follows:

#### Intention to Buy Scale

Q. with the help of the statements provided, could you tell me which statement best describes your intention to purchase the product in the next 6 months?

SINGLE CODE

Will definitely buy	1
Will probably buy	2
May or may not buy	3
Will probably not buy	4
Will definitely not buy	5
Don't Know / Cant Say	6

A major use of intention data is used in forecasting sales. However, it has been seen that sales forecast in industrial goods have been more accurate than forecasts for consumer products.

#### **Socio Economic Characteristics**

Social and Economic Characteristics of the respondents are often useful in forecasting their reactions. The knowledge of Socio-economic characteristics allow us to group respondents into various social groups; these groups tend to provide — on an average — a pretty accurate picture of the pattern of the behavior a member of the group will follow. Traditionally grouping was most frequently done on factors such as income, occupation, level of education, sex, marital status etc. But now a days other bases of classification are gaining momentum. Personality traits, preferences, perceived risks etc are some of the new demarcation.

In general, the identification of the consumer classification is useful in marketing so long as (i) there is a differential purchase behavior among the identified market segment (ii) there are practicable means of differentiating the marketing effort among segments (iii) it allows different marketing strategies to be put into action for different segment. It may be interesting to know that owners of Multi-Utility-Vehicles (MUV) have different personality traits than owners of small cars;

but this knowledge will be worthwhile only if it can be used in developing and evaluating appeals for each type of buyers.

Two commonly used and widely accepted classifications of consumers are by (i) stages of life cycle and (ii) Values and Lifestyles. The **Life Cycle Stage** theory postulates that households move through various stages — Bachelorhood, Honeymooners, Full Nest I, Full Nest II, Full Nest III, Empty Nest I, Empty Nest II, Solitary Survivor I and Solitary Survivor II — and each stage has a distinct buying and spending pattern. The **SRI Values and Lifestyles<sup>TM</sup> II** classification segments customers by values, attitudes, opinion, interest, club membership, spending patterns etc.

Classification of consumer is essential if we are to learn more of consumer behavior and utilize this information in developing more efficient classification techniques. Specialized Classification procedures like factor analysis, cluster analysis and discriminant analysis etc. are being employed more and more to help identify new and useful classifications.

### **Information on Extent of Knowledge**

The assertion that the “extent of knowledge” about a situation is one of the determinants of the behavioral response to it, borders on being a tautology. So long as the action taken is rational, the amount that is known (or is believed to be known) about a situation will influence the action that will be taken in that particular situation. For example — supposed that there is a new shampoo available in the market. However the product has not been advertised in any media and as such none of the customers are aware about the product. The next time a customer goes shopping for a shampoo, the chances are high that the customer will not buy the new shampoo. In other words, the extent of the purchasers knowledge concerning the relative concerning his knowledge about various brands play a major role in the choice of a brand.

Prediction of what action a respondent will take, is therefore often aided by knowing “How much does the consumer know?”. This information is crucial as they have direct impact on promotional campaigns. Products being launched for the first time need an exceedingly high promotion budget as opposed to the products that are already present in the market. The theory and practice of advertising is based on the premise that the consumer decision to buy or not buy is strongly affected by the level of awareness and the extent of knowledge of potential audiences concerning the product and its attributes. The job of the advertising is to build up awareness or - the extent of knowledge available with the consumers.

### **Information on Attitudes & Opinions**

Extensive studies of Attitudes and Opinions have been made by investigators in the field of psychology, sociology, political science etc. In Psychological or sociological experiments the term “attitudes” and “opinions” have been frequently

differentiated. **Attitude** is viewed as predisposition to act in a certain manner, whereas **Opinion** is defined as the verbalization of the attitude. Thus the statement by a respondent that she *prefers color to B&W television* would be an opinion expressing her attitude towards color television

However, in marketing, when attitudes and opinions are used to predict actions that the respondent will take — the difference between attitudes and opinion become rapidly blurred. As such the terms are used interchangeably in marketing. Attitude research in marketing has been conducted with the use of both qualitative and quantitative techniques. In either forms, the problems that are encountered in assessing attitudes and opinions are more severe than any other information gathering exercise. As such the information on attitudes and opinion is fraught with danger. However as attitudes and opinion of perspective buyers clearly affects purchase decisions, the marketing manager needs to be well informed about the nature of the relevant attitudes and opinions and the degree of intensity with which they are held. Attitudes and opinions have been used successfully in designing new products, advertising, selecting store location, developing customer care policies and in choosing company and brand / trade names

## 2.5 Experimentation

### Natural Experiments

A natural experiment is one in which the investigator intervenes only to the extent required for measurement. That means there is no manipulation of the assumed causal variables. The investigator merely looks at the effect. As such natural experiments can be looked upon as a form of “ex-post facto” research. In this type of study, the researcher approaches the data collection assuming that a controlled experimentation design has already been conducted; the variables of interest have occurred in a natural setting on their own violation. The researcher looks for respondents who have been exposed to the experimentation — also known as experimental group. If a control group is desired then researcher also has to look for a set of respondents who have not been exposed to the experimentation. Measurements then can be made on the variables of interest.

For example — Impact of a Print Based Commercial on Purchase Behavior — can be looked upon as a natural experimentation. The commercial can be launched by the advertising agency in the normal process. After the launch of commercial there would be two set of people - one who have been exposed to the commercial in the normal process (experimental group) and others who have not yet been exposed to the commercial (control group). The researcher then can meet respondents from both groups and ask relevant questions. The major drawback of natural experimentation is that one can never be sure whether the obtained relationship is causal or non-causal; since it is very difficult to isolate cause and effect in such cases.

## Controlled Experiments

In controlled experiments, investigator intervention is required almost at all the stage of the study. Specifically two types of intervention is required: (i) Manipulation of at least one assumed causal variable and (ii) Random assignment of subjects to experimental and controlled groups. Manipulation of at least one variable is required in order to administer the treatments whose effects are desired to be measured. Randomized allocation of subjects to groups is essential for the purpose of controlling differences arising out of extraneous variables.

For example — Impact of a Print Based Commercial on Purchase Behavior — can also be devised as a controlled experimentation. Assuming that the commercial was for a newspaper — the commercial is launched using a technique called “split run”. Under this technique - the commercial is released in say North and South Kolkata and not in East and West Kolkata. After the launch of commercial there would be two set of people - one who have been exposed to the commercial (experimental group) and others who have not yet been exposed to the commercial (control group). The off take from stores can be measured from north, south, east and west Calcutta and conclusions drawn regarding the effectiveness of the commercial in changing purchase behavior.

Both natural and controlled experiments can provide causal inferences of associative variation and sequence of events. But only controlled experiments can provide causal inference about the absence of possible causal factors.

## 2.6 Simulation

Simulation can be defined as “a set of techniques for manipulating a mode of a *real world process* for the purpose of finding numerical solutions that are helpful in deducing about the *real world process* that is being modeled”. Simulation as such is a model of the operational situation which is experimented with, instead of the real world situation.

The difference between simulation and other models of information is that simulation provides information from an “imitation” of the real world situation; whereas the other models of marketing information provide information directly from the situation being investigated. Models that are experimentally rich (i.e. contain complex among variables, probabilistic components, time dependencies etc.) are usually too difficult to solve by standard analytical methods such as calculus or various mathematical programming techniques. The researcher views the simulation model as an imitation of the process under study and attempts to run the system to see “what if” a particular policy was put into effect. The complexity of simulation problems requires computers with huge processing power to simulate the problem. Various simulation techniques are being developed for decision support systems. For the marketing researcher the role of computers and simulations should not be ignored. It is becoming increasing apparent that in future simulation techniques will play a major role in research.

## QUALITATIVE RESEARCH

### 3.1 Introduction

The word qualitative implies an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured [if measured at all] in terms of quantity, amount, intensity, or frequency. Qualitative researchers stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry. Such researchers emphasize the value-laden nature of inquiry. They seek answers to questions that stress how social experience is created and given meaning. In contrast, quantitative studies emphasize the measurement and analysis of causal relationships between variables, not processes. Qualitative inquiry are considered by many social and behavioral scientists to be as much a perspective on how to approach investigating a research problem as it is a method.

Below are the three key elements that define a qualitative research study and the applied forms each take in the investigation of a research problem:

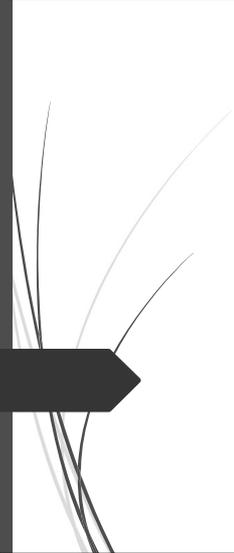
- Naturalistic – refers to studying real-world situations as they unfold naturally; non-manipulative and non-controlling; the researcher is open to what ever emerges from the study [i.e., there is a lack of pre-determined constraints on findings].
- Emergent – acceptance of adapting inquiry as understanding deepens and / or situations change; the researcher avoids rigid designs that eliminate responding to opportunities to pursue new paths of discovery as they emerge.
- Purposeful – cases for study [e.g., people, organizations, communities, cultures, events, critical incidences] are selected because they are “information rich” and “illuminating”. That is, they offer useful manifestations of the phenomenon of interest; sampling is aimed at insight about the phenomenon, not empirical generalization derived from a sample and applied to a population.

## 3.2 The Collection of Data

Data – observations yield a detailed, “thick description” [in-depth understanding]; interviews capture direct quotations about people’s personal perspectives and lived experiences; often derived from carefully conducted case studies and review of material culture. Researcher has direct contact with and gets close to the people, situation, and phenomenon under investigation; the researcher’s personal experiences and insights are an important part of the inquiry and critical to understanding the phenomenon. An empathic stance in working with study respondents seeks vicarious understanding without judgment [neutrality] by showing openness, sensitivity, respect, awareness, and responsiveness; in observation, it means being fully present [mindfulness].

There is attention to process; assumes change is ongoing, whether the focus is on an individual, an organization, a community, or an entire culture, therefore, the researcher is mindful of and attentive to system and situational dynamics. There is **unique case orientation** – assumes that each case is special and unique; the first level of analysis is being true to, respecting, and capturing the details of the individual cases being studied; cross-case analysis follows from and depends upon the quality of individual case studies. Immersion in the details and specifics of the data to discover important patterns, themes, and inter-relationships; begins by exploring, then confirming findings, guided by analytical principles rather than rules. The whole phenomenon under study is understood as a complex system that is more than the sum of its parts; the focus is on complex inter-dependencies and system dynamics that cannot be reduced in any meaningful way to linear, cause and effect relationships and/or a few discrete variables. Qualitative Research places findings in a social, historical, and temporal context; researcher is careful about [even dubious of] the possibility or meaningfulness of generalizations across time and space; emphasizes careful comparative case analysis and extrapolating patterns for possible transferability and adaptation in new settings. The qualitative meteorologist owns and is reflective about her or his own voice and perspective; a credible voice conveys authenticity and trustworthiness; complete objectivity being impossible and pure subjectivity undermining credibility, the researcher’s focus reflects a balance between understanding and depicting the world authentically in all its complexity and of being self-analytical, politically aware, and reflexive in consciousness.

It is very much true that most of the limitations you find in using qualitative research techniques also reflect their inherent strengths. For example, small sample sizes help you investigate research problems in a comprehensive and in-depth manner. However, small sample sizes undermine opportunities to draw useful generalizations from, or to make broad policy recommendations based upon, the findings. Additionally, as the primary instrument of investigation, qualitative researchers are often imbedded in the cultures and experiences of others. However, cultural embeddedness increases the opportunity for bias to enter into the way data is gathered, interpreted, and reported.



# Qualitative Research Tools and Techniques

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## 2 What is Qualitative Research?

- Qualitative research is research that addresses business objectives through techniques that allow the researchers to provide elaborate interpretations of market phenomena without depending on numerical measurements.
- Qualitative research is less structured than quantitative research.
- It is more dependent on researchers' interpretations
- It focuses on discovering true inner meaning and new insights

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## Uses of Qualitative Research

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- When it is difficult to develop specific and actionable problem statements research objectives
- When the research objective is to develop an understand of some new phenomena in great detail and much depth
- When the research objective is to understand how a phenomena occurs in its natural settings
- When some behaviour the researcher is studying is particularly context-dependent
- When a fresh approach to study some problem is needed

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## Problems with Qualitative Research

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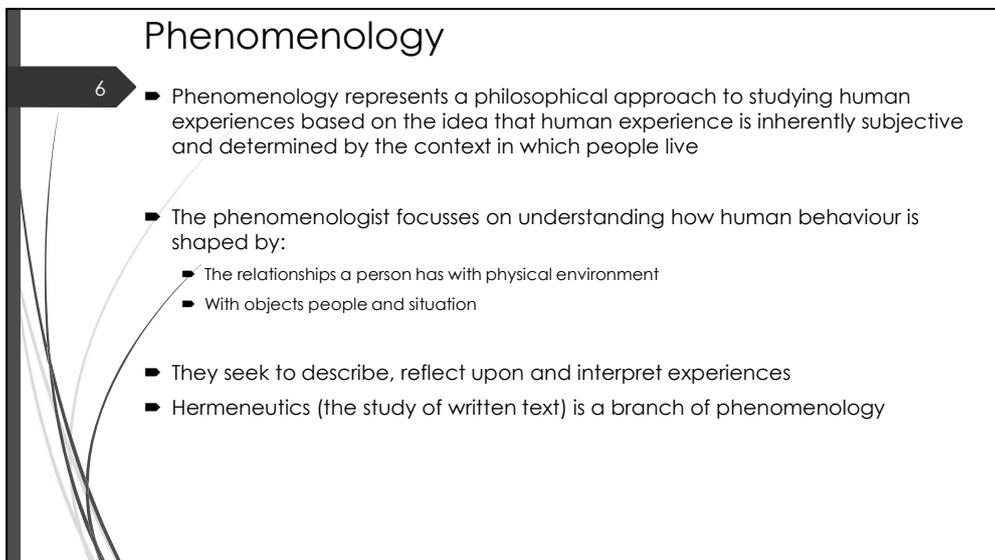
- Subjective in nature
  - Results are researcher dependent
- Lacks intersubjective certifiability
  - Same phenomenon may be studied by different researchers using same tools and techniques and they may come to different conclusion

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## Phenomenology

- Phenomenology represents a philosophical approach to studying human experiences based on the idea that human experience is inherently subjective and determined by the context in which people live
- The phenomenologist focusses on understanding how human behaviour is shaped by:
  - The relationships a person has with physical environment
  - With objects people and situation
- They seek to describe, reflect upon and interpret experiences
- Hermeneutics (the study of written text) is a branch of phenomenology

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## Ethnography

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- Ethnography represents ways of studying culture through methods that involve becoming highly involved with the culture
- Participation – Observation typifies ethnographic research
- Observation plays a key role in ethnography

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## Grounded Theory

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- Grounded theory represents an inductive investigation in which the researcher poses questions about information provided by the respondents to derive deeper explanations
- Two key questions:
  - What is happening here?
  - How is it different?
- Grounded theory does not begin with theory but extracts theories from the area under enquiry

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## Case Studies

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- ▶ Case study represents a documented history of a particular person groups, organisations or events
- ▶ Case study can be analyzed for important themes
- ▶ Requires cooperation of the parties being investigated

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## Common Procedures of Qualitative Research

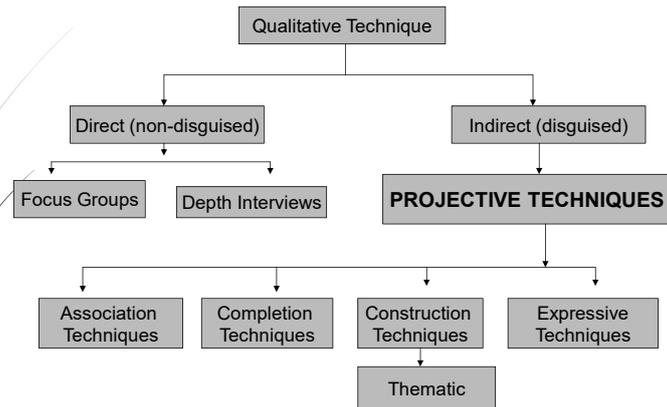
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## Qualitative Research Procedures

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## Focus Group Discussion

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## What is a Focus Group?

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- ▶ A Focus Group Discussion (FGD) is a carefully planned discussion to obtain perceptions of a defined interest area
- ▶ Key Characteristics
  - ▶ Conducted in a permissive, non threatening area
  - ▶ Composition of a regular group is 8 – 10 respondents
  - ▶ Conducted by trained interviewers called moderator
- ▶ Some notable aspects
  - ▶ The respondents should have some “common characteristics” relating to discussion topic
  - ▶ Three (3) focus groups are the minimum for a study

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## Planning and Conducting a FGD

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- ▶ Determine the objectives of the marketing research project
- ▶ Define the problem
- ▶ Specify the objectives of qualitative research
- ▶ State the objectives /questions to be answered by FGD
- ▶ Write a screening questionnaire to select respondents
- ▶ Develop a moderator's outline
- ▶ Conduct the Focus Group interviews
- ▶ Review tapes and analyze the data
- ▶ Summarize the findings
- ▶ Plan follow up research or action

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## How does FGD Help?

15

- Helps in collecting qualitative data
- Helps in determining the following:
  - Feelings
  - perceptions
  - manner of thinking of participants regarding products, services, programs or opportunities
- Helps in identifying attitudes and perceptions as developed by interaction with other people
- Helps promote self-disclosure among participants

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## Variations on FGD

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- Two way focus group:
  - Two groups conducted simultaneously with each group observing the other without their knowledge
- Dual moderator group:
  - Two moderators – one guides the discussion and other encourages the participant
- Dueling moderator group:
  - Two moderators – each taking opposing viewpoint
- Respondent-moderator group:
  - A respondent is asked to play the moderator
- Clients participants group:
  - Client participates in the focus group
- Mini groups
  - A focus group conducted on 3-4 people
- Tele-session groups:
  - Conducted over phone or video conferencing

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## Advantages & Disadvantages

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### Advantages

- Easy to set up and administer
- Fast and relatively inexpensive
- Simulates dialogues and new ideas
- Generates ideas for evaluation

### Disadvantages

- Requires special moderation skills
- Analysis is tedious and open to interpretation
- Avoiding biases can be difficult
- Results may not be generalized to the entire population

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## In-Depth Interviews

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## What is an In-Depth Interview?

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- An in-depth interview (DI) is a one to one interview conducted with the aim of obtaining insight into the area of interest
- Key Characteristics
  - One Respondent and One Interviewer
  - Is normally of a longer duration (2-3 hours)
  - Uses special probing techniques to get to the root of the issue
- Some notable aspects
  - A great deal of freedom is provided to probe any aspect
  - No minimum requirement, usually about 10 DI's suffice

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## Planning and Conducting a DI

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- Thematizing
- Designing
- Interviewing
- Transcribing
- Analyzing
- Verifying
- Reporting

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## Key Characteristics of a DI

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- Open ended questions
- Semi Structured Format
- Seek understanding of the problem and interpretation
- Conversational in nature
- All response are recorded
- All observations and reflections are recorded

**“Recording of reflections an important part of DI as pauses, inflexions and para-linguistics also convey meaning”**

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## Do's and Don'ts of Conducting DI

22

- **Do's**
  - Begin with giving a clear cut idea of the research
  - Listen to everything the respondent says
  - Explore key aspects and key words
  - Probe for clarity of understanding
  - Prepare for Unexpected Answers & Situations
  - Guide the respondent to the root of the problem
  - Play dumb if necessary
- **Don'ts**
  - Influence the respondent
  - Move Quickly through the topic
  - Interrupt the respondent
  - Manipulate the matter

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## Projective Techniques & Thematic Aptitude

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## Classification of Projective Techniques

- Construction Techniques
  - Picture Response or Thematic Aptitude
  - Cartoon Test
- Completion Techniques
  - Sentence Completion
  - Story Completion
- Expressive Techniques
  - Role Playing
  - Third Person Technique
- Associative Techniques
  - Word Association
  - Symbolism

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## Characteristics of Projective Techniques

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- It aims at understanding underlying motivation, attitude
- Aims at overcoming respondent's unwillingness
- Judgment is required in interpretation of responses
- Techniques are expressive in nature
- Themes are used to elicit a response
- Projective techniques are indirect in nature
- Vague situations are used as stimuli
- It is exploratory in nature

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## Projective Techniques Examples:

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- Word Association:
  - Villages  
*Serene Conservative Quaint Friendly Reliable*
  - Cities  
*Brash Rushed Liberal Modern Cold*
- Sentence Completion:
  - *Golfing is for .....*
  - *People who visit museum are .....*
- Third Person Technique:
  - "Ram and Rohini are a new couple of your age in the city. You have met them a couple of times. They are planning a vacation to Kashmir  
*What do you think are the reasons for Ram and Rohini going on a vacation to Kashmir?*

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## Projective Techniques Examples:

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### Thematic Aptitude:



Assume that the guy and the girl in the picture are planning to get married and go on a honeymoon. The girl and the guy meet at an open restaurant to discuss and finalize the plans for the honeymoon. The guy says "I think Shillong would be a good option"

*What do you think is the girls response?*

*If you were to counsel the girl, which all honeymoon spots should the girl consider*

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## Thematic Aptitude

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- Thematic means themes are elicited based on subject's perceptual interpretation of self.
- Construction techniques include picture response and cartoons.
- Respondents interpretation of the pictures gives indication of individuals personality, beliefs, feelings and attitude towards the situation.

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## Thematic Aptitude

### Advantages:

- Tend to elicit unwilling responses
- Increase the validity of responses by disguising the purpose
- Helpful when underlying motivations beliefs & attitudes are operating at a subconscious level
- Reduces unintentional misunderstanding and misinterpretation or misleading of the researcher

### Disadvantages:

- They require highly trained interviewers
- They tend to be expensive
- There is a serious risk of interpretation bias
- Some projective techniques like role playing require respondents to engage in unusual behavior

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Thank You

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## DESIGN OF EXPERIMENTS

### 4.1 Introduction

If researchers intend to make cause-and-effect statements, they typically use experimental research, which is usually, but not always, conducted in a laboratory. The laboratory environment allows the experimenter to make controlled observations using the steps of the scientific method.

While formulating the problem, the researcher raises a question about cause and effect. Perhaps the investigator wonders whether certain environmental conditions improve or adversely affect performance. The investigator might operationally define the environmental condition of interest as “background noise” and the performance as “Output”. Next, the investigator proposes an answer to the research question (“*What is the relationship between output and background noise?*”), an answer called a hypothesis. A **hypothesis** postulates a relationship between two variables, an **independent variable** (that which the experimenter manipulates – in this case, the background noise) and a **dependent variable** (that which changes as a consequence of manipulation of the independent variable – in this case, the output). The experimenter hypothesizes that “*an increase in loudness of background noise will produce a decrease in output*”.

Once the problem to be investigated has been selected, the experimenter must decide how to conduct the study. In the above study, for example, all subjects would be taken to a laboratory for testing and would use the same machine to produce the output. The experimenter would have to decide whether to use two groups of subjects with comparable skills and expose one group to a music loudness level different from that used with the other (a between-subjects design) or sequentially expose the same subjects to music of two loudness levels (a within-subjects design). Each procedure has advantages and disadvantages. The experimenter collects data (typing speed at different loudness levels) to test the hypothesis according to the selected experimental design.

The data are analyzed by appropriate statistical methods. In this case, mean scores of the two sets of typing speed/loudness level data would be compared to

see if differences are significant or could be due to chance.

Based on analysis of data, conclusions may be drawn about the hypothesized relationship between the independent and dependent variables. The hypothesis, that “an increase in loudness of background music will produce a decrease in typing speed”, may be supported by the data (the increase in loudness of background music – manipulation of the independent variable – did produce a decrease in output – the dependent variable) or may not be supported by the data (the increase in loudness did not produce a decrease in typing speed).

The process used in and the results obtained from the study are gathered and written. If the study results are of sufficient significance, they may be published in a scientific journal (as mentioned above, allowing the study to be replicated or refuted by another researcher) and may eventually be used quite pragmatically. For example, if a study determines that background noise decreases output, certain employers would be likely to make use of the findings in their businesses. Scientific knowledge in all sciences grows as a result of information collected through the scientific method.

Experimental research is based on a methodology that meets three criteria that are important if the results are to be meaningful. These criteria are as follows:

- Random Assignment – Test subjects must be randomly assigned to the treatment groups to control for creation of groups that may systematically differ in another way that impacts the outcome of the treatment.
- Experimental Control – All aspects of the treatments are identical except for the independent variable. If all other factors are controlled and kept constant, then if measurable differences are found in the outcomes, the researcher can be assured that the difference is due the independent variable (treatment).
- Appropriate Measures – The measures or outcomes must appropriate for testing the hypothesis. The outcome measured must represent the idea being tested in the hypothesis in order for the results to be valid.

In the slides we discuss about the various kinds of experimental designs.

# Design of Experiments

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## Introduction

- **What is an Experiment?**
  - A process of manipulating one or more independent variables and measuring their effect on one or more dependent variables.
  - A test under controlled conditions that is made to demonstrate a known truth, examine the validity of a hypothesis, or determine the efficacy of something previously untried.
- **What is experimentation?**
  - Testing of an idea
  - A set of actions / observations. Performed to verify a hypothesis or to research causal relationship between phenomena.

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## [ Why Experiment? ]

- **To infer about causal relationships**
- **Concept of Causality:**
  - Refers to the **Cause and Effect Relationship** between variables
  - Helps in measuring the predictability between the two events
  - Is probabilistic in nature
    - Assume that other variables do not have a significant impact
  - It can never be proved deterministically
  - We can only infer cause and effect relationship

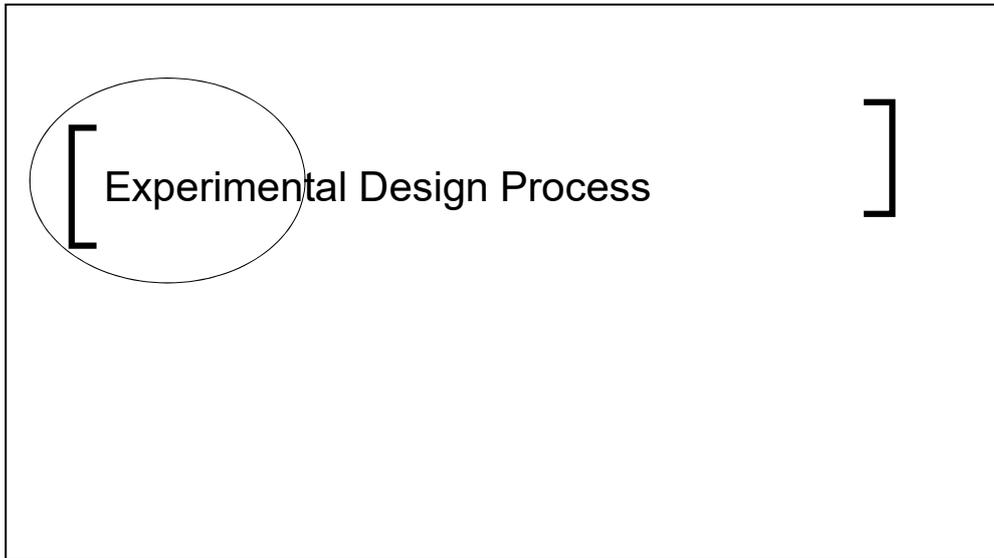
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## [ Some Concepts ]

- **Independent Variables:**
  - Are variables manipulated by the researcher
  - Are assumed to be the cause of some phenomenon.
- **Dependent Variables:**
  - Are variables which change because of change in independent variables
  - Are caused by independent variables
- **Experimental Designs**
  - Is the design of all information-gathering exercises where variation is present, whether under the full control of the experimenter or not.
  - Often the experimenter is interested in the effect of some process or intervention ("**treatment**") on some objects ("**experimental units**")

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[ Steps in Detail (1/3) ]

- **Determine the Objectives**
  - Objectives are too many to cover in a single study
  - The same objective may be achieved in different ways
  - Once objectives are decided we develop the experimentation strategy
  - Plan the action that needs to be taken on success or failure of the objectives
  
- **Define the Measure of Success**
  - How to know when we have achieved the objectives?
  - Measures must be measurable, preferably quantitative in nature
  - Avoid overcrowding of responses or respondents

6

3

## [ Steps in Detail (2/3) ]

- **Verify Feasibility**
  - Identify the minimum sample size and trials required
  - Cost feasibility also needs to be established
    - Also depends on Sample Size and Trials
- **Design the Experiment**
  - Identify the controls to be varied
  - Identify the correct experimental design
  - Determine whether the number of designs or trials is too large
    - If need be shift through various designs to identify the most feasible
- **Run the Experiment**

Apply the KISS Principle

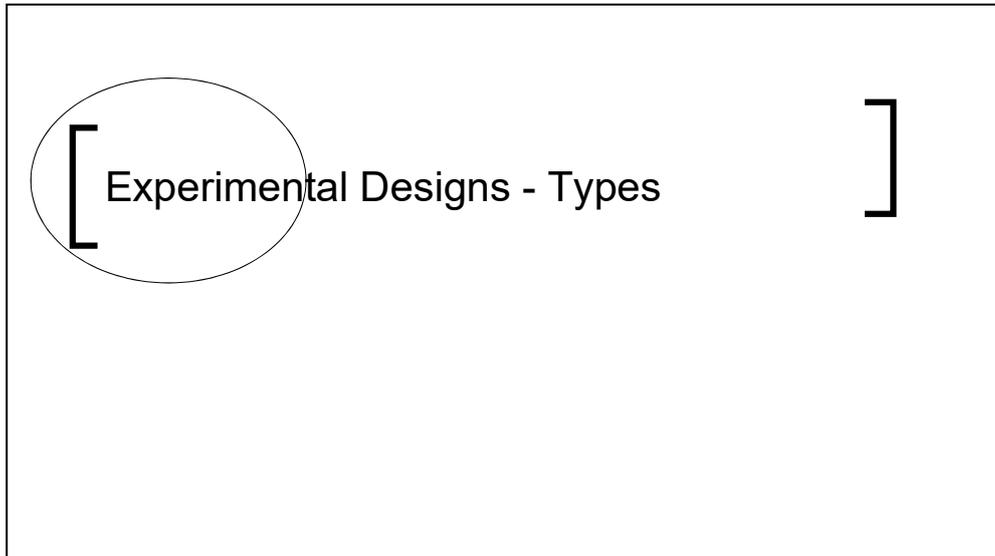
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## [ Steps in Detail (3/3) ]

- **Collect and Analyse Data**
  - Identify suspect data – outlier and extreme values
  - Analyse data as per the experimental design
  - May wish to analyse critical data first
- **Determine and Verify the Responses**
  - Identify the significance of the outcomes
  - The outcomes – either singly or jointly – allows the researcher to predict the behaviour of cause and effect relationship
  - Allows for optimization of key variables
- **Act on the Results**

8

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## [ Types of Experimental Designs ]

- **Pre-Experimental Designs:**
  - Do not employ randomization process to control for exogenous factors
    - One-Shot Case study, One Group Pre-Test-Post-Test, Static Group Design
- **True Experimental Designs:**
  - Employs full randomization techniques to control for exogenous factors
    - Pretest Posttest Control Group, Posttest Only Control Group, Solomon Four Group Design
- **Quasi-Experimental Designs:**
  - Full randomization techniques are not applicable
    - Time Series, Multiple Time Series
- **Statistical Experimental Designs:**
  - Allows for statistical control and analysis of the impact of external variables
  - Designed on the basis of their characteristics and usage
    - Randomized Block Design, Latin Square Design, Factorial Designs

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5

## [ Symbols and Terminology ]

- **X** : The exposure of a group to an independent variable, treatment or event; the effect of which are to be determined
- **O** : The process of observation or measurement of the dependent variable on the test unit
- **R** : The random assignment of test units to separate treatment
- **EG** : Experimental Group
- **CG** : Control Group [No Experimentation Performed]
  
- **In addition:**
  - Movement from left to right indicate movement through time
  - Horizontal alignment of symbols implies that all those symbols refer to a specific treatment group
  - Vertical alignment of symbols implies that the activities or events that occur simultaneously

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## [ Pre-Experimental Design (1/3) ]

- **One Shot Case Study:**  
X O<sub>1</sub>
  
- **Basic Procedure:**
  - Measurement of an identified "outcome" after a treatment has been implemented.
- **Disadvantages:**
  - No measures available for comparison pre and post study
  - Lack of control of extraneous variables

**Research Problem: "Effectiveness of a Commercial in a Departmental Store"**

<b>Variable of Interest</b>	:	<b>Ad-Recall</b>
<b>Methodology</b>	:	<b>Intercept Interviews</b>

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## [ Pre-Experimental Design (2/3) ]

- **One Group Pretest Post Test:**

$O_1 \quad X \quad O_2$

- **Basic Procedure:**

- Measurement of an outcome both pre and post exposure

- **Disadvantages:**

- No Control Group
- Maturation Effect
- Effect of the treatment on the study cannot be isolated

**Research Problem:** "Awareness about Fair & Lovely after a new ad campaign"

<b>Variable of Interest</b>	:	Awareness
<b>Methodology</b>	:	Structured Interviews, Pre Launch and Post Launch Measurement

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## [ Pre-Experimental Design (3/3) ]

- **Static Group Design**

<b>EG:</b>	<b>X</b>	$O_1$
<b>CG:</b>		$O_2$

- **Basic Procedure:**

- Two Groups: Experimental Group (EG) and Control Group (CG)
- EG exposed to the experiment, CG not exposed
- $(O_2 - O_1)$  gives the impact of X

- **Disadvantages:**

- Lack of Randomization
- Treatment, Selection Bias may be present

**Research Problem:** "Effectiveness of a New Ad Campaign"

<b>Variable of Interest</b>	:	Recall of the Ad
<b>Methodology</b>	:	One Store Visitors shown the Ad The Other Store Visitors not Shown Structured Questionnaires

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## [ True Experimental Designs (1/3) ]

- **Posttest Only Control Group**

EG:	R	X	O <sub>1</sub>
CG:	R		O <sub>2</sub>

- **Basic Procedure:**

- Random Allocation of Subjects to EG and CG
- Effect of Treatment is obtained by (O<sub>2</sub> – O<sub>1</sub>)
- Simple to implement

- **Disadvantages:**

- No pre-test observations for comparison
- Sensitive to Mortality

**Research Problem:** "Effectiveness of a New HR policy"

**Variable of Interest :** Effectiveness of HR Policy

**Methodology :** Random Assignment of Employees to EG & CG  
EG Exposed to new HR Policy  
Measure Effectiveness

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## [ True Experimental Designs (2/3) ]

- **Pretest-Posttest Control Group**

EG:	R	O <sub>1</sub>	X	O <sub>2</sub>
CG:	R	O <sub>3</sub>		O <sub>4</sub>

- **Basic Procedure:**

- Random Allocation of Subjects to EG and CG
- Effect of Treatment is obtained by (O<sub>2</sub> – O<sub>1</sub>) – (O<sub>4</sub> – O<sub>3</sub>)
- Requires two groups and two measurement

- **Disadvantages:**

- Pretest measurement can impact subsequent responses
- More time and effort required

**Research Problem:** "Effectiveness of a New HR policy"

**Variable of Interest :** Effectiveness of HR Policy

**Methodology :** Random Assignment of Employees to EG & CG  
EG Exposed to new HR Policy / Measure Effectiveness pre & post implementation

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## [ True Experimental Designs (3/3) ]

- **Solomon 4-Group-6 Design**

EG:	R	O <sub>1</sub>	X	O <sub>2</sub>
CG:	R	O <sub>3</sub>		O <sub>4</sub>
EG:	R		X	O <sub>5</sub>
CG:	R			O <sub>6</sub>

- **Basic Procedure:**
  - 4 groups and 6 observations
  - Combination of previous two designs
- **Disadvantages:**
  - Difficult to implement and monitor

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## [ Quasi Experimental Designs (1/2) ]

- **Simple Time Series**

O<sub>1</sub> O<sub>2</sub> O<sub>3</sub> O<sub>4</sub> X O<sub>5</sub> O<sub>6</sub> O<sub>7</sub> O<sub>8</sub>

- **Basic Procedure**
  - A series of periodic measurement
  - Treatment occurs naturally or is induced by experimenter
- **Disadvantages:**
  - Less control on exposure to stimulus

Research Problem: "Production per month after installation of new machinery"

Variable of Interest	:	Production per month
Methodology	:	Monthly production data pre and post installation of new machinery`

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## [ Quasi Experimental Designs (2/2) ]

- **Multiple Time Series**

EG: O<sub>1</sub> O<sub>2</sub> O<sub>3</sub> O<sub>4</sub> X O<sub>5</sub> O<sub>6</sub> O<sub>7</sub> O<sub>8</sub>  
 CG: O<sub>1</sub> O<sub>2</sub> O<sub>3</sub> O<sub>4</sub> O<sub>5</sub> O<sub>6</sub> O<sub>7</sub> O<sub>8</sub>

- **Basic Procedure**

- Similar to simple time series
- CG added for isolating effects of treatment

- **Disadvantages:**

- Less control on exposure to stimulus
- Non Random Exposure to treatment

**Research Problem:** "Test Effectiveness of Ad over 1 year"

<b>Variable of Interest</b>	:	Effectiveness of Ad
<b>Methodology</b>	:	EG: Cities in which Ad shown CG: Cities in which Ad not shown

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[

Statistical Designs

]

20

## [ Introduction ]

- **The most powerful set of experimental designs**
- **Allows for statistical control**
- **Based on the Principles of Randomisation, Replication and Local Control**
- **Effect of multiple external variables can be measured**
- **Specific external variables can be statistically controlled**
- **Complex to implement and analyse**
- **Four broad Designs:**
  - Completely Randomized Design (CRD)
  - Randomized Block Design (RBD)
  - Latin Square Design (LSD)
  - Factorial Designs

### WARNING

Should not be used without proper knowledge and  
without statistical consultation

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## [ Completely Randomized Design ]

- **Simplest of All Statistical Designs**
- **Uses the principles of Randomization and Replication**
- **Applicable when the experimental plane is completely homogenous**
- **Advantages:**
  - Extremely flexible
  - Allows for "n" number of treatments either equally or unequally
  - Robust, if data is lost information can be recovered
  - Statistical Analysis Requires ANOVA 1 Way

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## [ Randomized Block Design ]

- **Uses the principles of Randomization and Replication**
- **Applicable when the experimental plane is heterogeneous in one direction**
  
- **Advantages:**
  - Extremely flexible
  - Allows for "n" number of equal treatments
  - Each treatment replicated in each block
  - Robust, if data is lost information can be recovered
  - Statistical Analysis Requires ANOVA 2 Way

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## [ Latin Square Design ]

- **Uses the principles of Randomization, Replication and Local Control**
- **Applicable when the experimental plane is heterogeneous in both directions**
  
- **Advantages:**
  - Not Flexible – Requires the same number of replications as the number of treatments
  - Always a Square Design
  - Treatment occurs once and only once in each heterogeneous plane
  - Robust, if data is lost information can be recovered
  - Statistical Analysis Requires ANOVA 2 Way (With Replication)

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## [ Factorial Designs ]

- **Effect of various variables can be studied simultaneously**
- **Normally each factor is blocked at 2 levels – High and Low**
- **Assumed that Factor Interaction is additive in nature**
- **Most Complex of All Designs**

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## [ Validity of an Experiment ]

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## [ What is Validity? ]

- **The ability of an experiment to give correct results**
- **Two types of Validity**
  - Internal Validity
  - External Validity
- **Not always possible to control validity**
- **Researchers have to compromise on validity**

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## [ Internal Validity ]

- **An experiment is said to be internally valid when the observed effects (outcome) are solely due to experimental treatment**
- **Eight distinct Levels**
  - History
    - Refers to wrong notions or beliefs
  - Maturation
    - Refers to the learning ability of animate test subjects
  - Testing
    - Refers to the impact of previously conducted experiments
  - Instrumentation
    - Refers to correct usage of recording and measuring instruments
  - Selection
    - Refers to correct selection of sample size
  - Mortality
    - Refers to inability / unwillingness to provide responses
  - Regression
    - Refers to the ability of giving "on-the-average" response
  - Selection Interaction
    - Refers to the effects that occur between investigator and investigated

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## [ External Validity ]

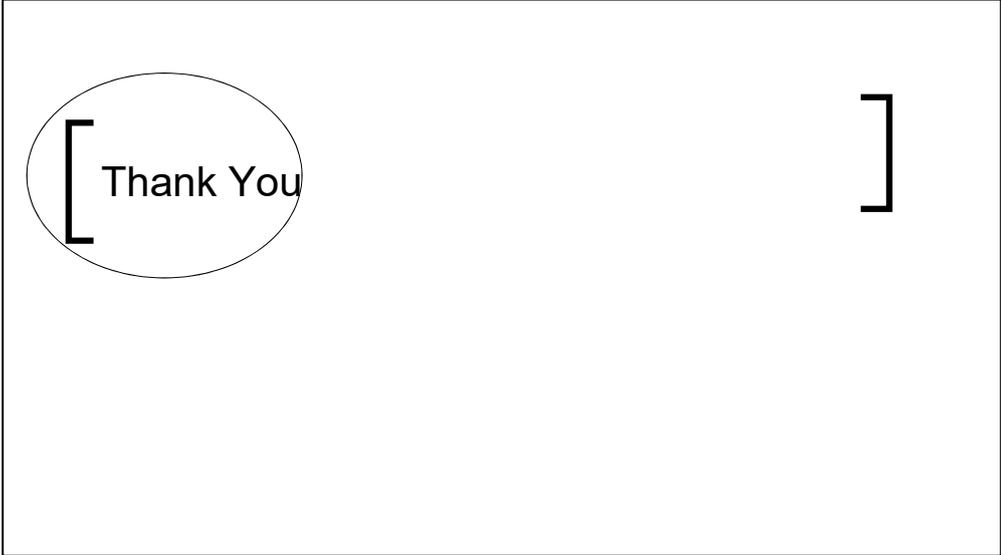
- Refers to the “Conclusion Drawing Ability” of the experiment
- Four different components:
  - Reactive Effect of Testing
    - Ability to learn and anticipate questions and responses and modify behaviour accordingly
  - Reactive Effect of Experimental Situations
    - Ability to modify behaviour according to the surroundings
  - Reactive Effect of History of treatment
    - Inability to control the effect of exogenous variables
  - Reactive Effect of Selection Treatment Interaction
    - Ability to infer from the sample to the population

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## [ Limitations of Experimentation ]

- **Time:**
  - Experiments are time consuming, specially in measuring long term effects
- **Cost:**
  - Expensive in nature as cost has to be incurred for EG, CG and multiple measurements
- **Administration:**
  - Requires experienced and knowledgeable administrator
  - Administration is generally difficult because of human nature
  - Effects of exogenous variables are difficult to control

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## MEASUREMENT & SCALING

### 5.1 Introduction

Measurement is the process of describing some property of a phenomena of interest usually by assigning numbers in a reliable and valid way. The numbers convey information about the property being measured. When numbers are used, the researcher must have a rule for assigning a number to an observation in a way that provides an accurate description. We measure attributes of objects. We do not measure objects. For example we measure sales of a company. Sales is the attribute of the object company. Researcher has to know what to measure before knowing how to measure something. The problem definition process should suggest the concepts that must be measured. **Concept** can be thought of as a general idea that represent something of meaning. Concept such as age, education, sex, the number of children, are relatively concrete and easy to understand. Other concepts are relatively abstract. For example, concepts of loyalty, personality, power, trust and so on are more difficult to define and measure. Loyalty, for example, can be thought of as a combination of customer share and commitments. Here we can see that loyalty consist of two components – the first is behavioral and the second is attitudinal.

Researchers measure concepts through a process known as **operationalization**. This process involves identifying scales that correspond to variance in the concept. In other words, scales provide correspondence rules that indicate certain values on a scale correspond to some true value of a concept. For example, assign the number 1 if the sales representative is completely untrustworthy else assign number 7. Sometimes a single variable cannot capture a concept alone. Using multiple variables to measure one concept can often provide a more complete account. **Construct**, therefore, is a term used for concept that are measured with multiple variables. Constructs are underlying dimensions which are subjective in nature and are complex abstractions. They represent implicit dimensions of concepts. Constructs are not directly measured. Construct are usually measured through indicator variable. These indicator variables can be directly measured

on the respondents can give responses to these indicator variables without much random error.Â

## 5.2 Key Criteria for Evaluation

The three criteria for evaluating measurements are reliability, validity and sensitivity.

**Reliability** is an indicator of a measure's internal consistency. A measure is said to be reliable when different attempts at measuring something converges on the same result. **Internal consistency** represents a measure's homogeneity. In other words, it represents the extent to which each indicator of a concept converges on some common meaning. Internal consistency of a multiple item measure can be measured by correlating scores on subset of items making up the scale. *Split half method* and *Cronbach Alpha* are two popular methods for determining internal consistency. The **test-retest method** of determining reliability involve administering the same scale or measure to the same responded at two separate time to test for stability. If a measure a stable over time, each test should obtain similar results, in other words test retest method represents a measures *repeatability*.

Good measure should be both consistent and accurate. Reliability represents how consistent the measure is; where as validity refers to the accuracy of a measure. In other words validity represents how accurately a construct is capturing the concept. There are four basic approaches to establish in validity (a) face validity, (b) content validity (c) criteria validity and (d) construct validity. Another important characteristic of a measurement system is the **sensitivity** of the measurement. Sensitivity refers to an instrument ability accurately measure variability in a concept.

In the next few slides we shall study in detail the basic concepts of measurement and how to construct scales which are useful in research research

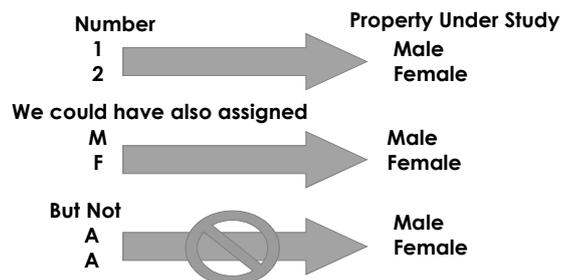
# Measurement & Scaling

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## Measurement

Measurement can be described as a way of obtaining symbols to represent the properties of persons, objects, events or states under study - in which the symbols have the same relevant relationship to each other as do the things represented



1:1 CORRESPONDENCE BETWEEN THE NUMBER SYSTEM  
AND PROPERTY UNDER STUDY

2

1

## Scaling

- ▶ The ability to assign numbers to objects in such a way that:
  - ▶ Numbers reflect the relationship between the objects with respect to the characteristics involved
  - ▶ It allows investigators to make comparison of amount and change in the property being measured
- ▶ Four (4) primary types of scales - Nominal, Ordinal, Interval and Ratio
- ▶ Three (3) important characteristic of real number system are used to devise the above scales:
  - Order : numbers are ordered
  - Distance : differences between numbers are ordered
  - Origin : series has a unique origin indicated by 0 (zero)

3

## Scales - A Quick Overview

### □ NOMINAL SCALE

- Least restrictive. Does not possess order, distance or origin
- Numbers assigned serve only as a label or tags for identifying objects, properties or events
- Example
  - East : 1 West : 2
  - North : 3 South : 4
- Permissible mathematical operations: percentage, frequency, mode, contingency coefficients

### □ ORDINAL SCALE

- Possess order but not distance or origin
- Numbers assigned preserve the order relationship (rank) and the ability to distinguish between elements according to a single attribute & element
- Example
  - Bata : 1st Sree Leathers : 2<sup>nd</sup>
  - Khadims: 3rd Titas : 4<sup>th</sup>
- Permissible mathematical operations: (+) median, percentile, rank correlation, sign test and run test

4

2

## Scales - A Quick Overview

### □ INTERVAL SCALE

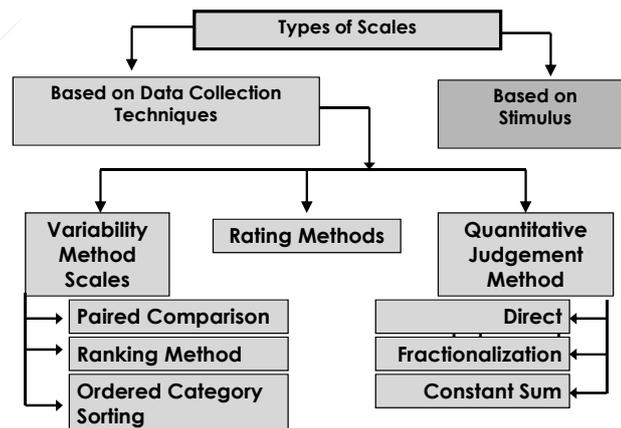
- Possess the characteristic of order and distance
- DOES NOT possess origin
- Numbers are assigned in such a way that they preserve both the order and distance but do not have a unique starting point
- Example: Temperature scale  
50° F is twice as warm as 25° F  
10° C is not twice as warm as -3.9° C
- Permissible mathematical operations : (+) Mean, average deviation, standard deviation, correlation, t, F

### □ RATIO SCALE

- Possess the characteristic of order distance and origin
- Numbers are assigned in such a way that they preserve both the order distance and origin
- Example: length (KM scale), weight (KG scale)  
50 KG is twice as heavy as 25 KG  
110.24 pound is twice as heavy as 55.12 pound
- Permissible mathematical operations: ALL

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## Scaling Techniques - Overview



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## Variability Method Scales

### 1. PAIRED COMPARISON

- Respondent to choose one of the pair of stimulus that “dominates” the other w.r.t some designated property of interest

- Example:

Compare 6 organizations on “the best place to work”

→  ${}^6C_2 = 15$  paired comparison on the comparison grid

1	2	3	4	5	6	2	1	5	6	4	3	
1	x	0	1	1	1	1	2	x	1	1	1	1
2	1	x	1	1	1	1	1	0	x	1	1	1
3	0	0	x	0	0	0	5	0	0	x	1	1
4	0	0	1	x	0	0	6	0	0	0	x	1
5	0	0	1	1	x	1	4	0	0	0	0	x
6	0	0	1	1	0	x	3	0	0	0	0	0

- Implicitly assumes (a) transitivity will be maintained (b) respondent has experience of all the brands on the same attribute

1 of 2

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## Variability Method Scales

### 2. RANKING METHOD

- Requires respondent to order stimulus w.r.t Some designated property of study

- Example:

Rank 6 companies on “best place to work”

→ Normally the respondent is asked to order K/N i.e.

Rank top 3 objects (=K) out of the 6 objects (=N)

- Implicitly assumes (a) respondent has experience on all the objects on the same attribute (b) respondents ranking will correctly reflect his preference

### 3. ORDER CATEGORY SORTING

- Requires respondent to assign objects to ordered categories
- Useful when a large number of objects are to be rated

2 of 2

8

4

## Rating Scales

- One of the most popular & easily applied data collection technique
- The respondent is required to place the product / attribute under study on a ordered set of categories and thereby assign a “degree of possessed characteristic” to the attribute under study
- Rating scales can be (a) numerical (b) graphical (c) verbal (d) a mix of all three

### ► Example

Very Good	[ ]
Somewhat Good	[ ]
Neither Good nor Bad	[ ]
Somewhat Bad	[ ]
Very Bad	[ ]



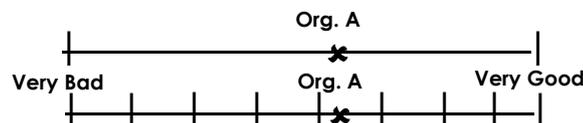
- It assumes (a) items are being capable of being ranked (b) respondent can psychologically break the ranking into equal intervals (c) scale is ordinal in nature

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## Quantitative Judgment Scales

### 1. DIRECT JUDGMENT SCALE

- An advancement on the rating method scale
- Assumes that the respondent is able to give a numerical rating with each stimulus with respect to some designated attribute
- The scales used are assumed to be interval or ratio scales
- Is normally of two types
  - Limited response category - The respondent is limited to choose between one of the given categories
  - Unlimited response category - The respondent is free to assume the magnitude of scale and divide it as per his convenience
- Example:



1 of 2

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## Quantitative Judgment Scales

### 2. FRACTIONALIZATION

- The respondent is asked to give numerical estimates to the attributes under study relative to a previously exposed attribute

- Example:

Assume that the Work Environment of A is equal to 1.00. Now rate the relative Work Environment of the following companies with respect to A:

B : 1.50    C : 0.75    D : 2.20    E : 0.50

### 3. CONSTANT SUM

- The respondent is required to distribute a "number of points - usually 100" over a set of alternatives such that the numbers distributed reflect the relative magnitude of importance of alternatives

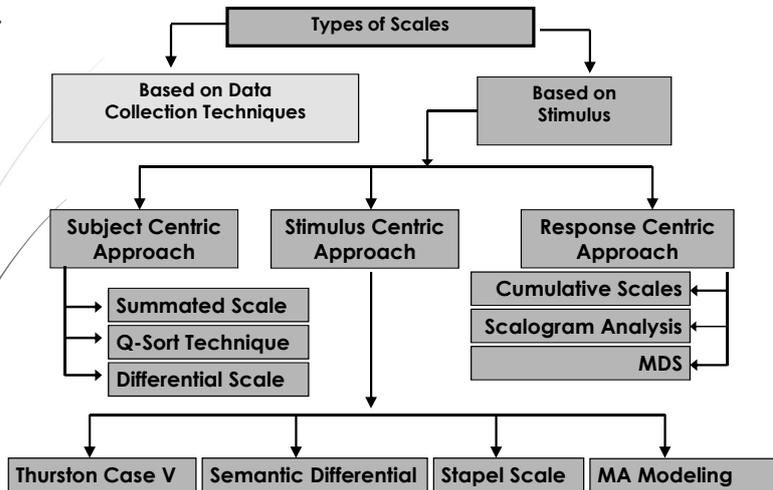
□ Example:

Environment	: 22
Salary and Perks	: 48
Job Security	: 30
Openness	: 06
TOTAL	: 100

2 of 2

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## Scaling Techniques - Overview



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6

## Development of Stimulus Scales

- Follow rigorous development procedure
  - Create
    - Set up the various stimulus which will act as the parts of the scale
  - Test
    - Test the scale to see how the responses are distributed on each stimulus
  - Normalize
    - Normalize or Standardize the response categories. Re-Test if necessary
  - Validate
    - Check using Factor or Cluster Analysis whether the scales are predicting correctly
  - Use
    - Use it in the actual survey

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## Subject Centric Scales

### 1. SUMMATED SCALE (LIKERT SCALE)

- Respondent are required to respond to each of the statement in terms of several degrees of agreement / disagreement
- Each response is given a weight - (not disclosed to the respondent)
- Similar to direct judgment method in look and feel and is useful in judging the degree of agreement / disagreement
- Example: To identify the outgoing type of personality

Please rate yourself on the following statements

	SA	A	NAND	D	SD
1. I like playing cricket	5	4	3	2	1
2. I like going to parties	5	4	3	2	1
3. I love reading novels	5	4	3	2	1
4. Enjoy life is my motto	5	4	3	2	1
5. I enjoy working alone	5	4	3	2	1

Item 1, 2, 4 are favorable and carry (+2 +1 0 -1 -2) as weights

Item 3 & 5 are unfavorable and carry (-2 -1 0 +1 +2) as weights

Response set {A, SA, D, SA, SD} gets {+1 +2 +1 +2 +2} = + 8 [outgoing]

Response set {A, N, SA, D SA} gets {+1 +0 -2 -1-2} = - 4 [not outgoing]

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## Subject Centric Scales

### 2. Q SORT TECHNIQUE (STEPHENSON SCALE)

- ▶ Respondent are required to sort a set number of statements in predetermined categories (usually 3 / 5 / 7 / 11) - with the restriction that at least 'k' statement should be placed in each category
- ▶ Each category is given a weight and then these weight are used to determine the subject's attitude towards the attitude under study
- ▶ Normally used as a precursor to factor / cluster analysis

### 3. DIFFERENTIAL SCALE (THURSTON SCALE)

- A modification of the Q-Sort Technique
- It assumes that the respondent will agree with a subset of the statements - this agreement in turn revealing the preference of the consumer
- The development of the statements for the purpose of the study is done using Delphi Technique

Most Agreed with (Two Items)	Neutral (Three Items)	Least Agreed with (Two Items)
(+1)	(0)	(-1)

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## Stimulus Centric Scales

### 1. SEMANTIC DIFFERENTIAL SCALE

- ▶ SEMANTIC : relating to the study of meaning and the change in meaning
- ▶ This scale uses "SEMANTIC" to understand the respondent's "interpretation of meaning"
- ▶ It allows the researcher to probe both the direction and intensity of respondents attitudes using interval scaled data
- ▶ Mainly used in image mapping studies

- ▶ Example: understanding the corporate image of BATA

Powerful	_X_   _   _   _   _   _   _	Weak
Modern	_   _   _   _   _   _X_   _   _	Old fashioned
Warm	_   _   _X_   _   _   _   _   _	Cold
Reliable	_   _   _   _   _   _   _X_   _	Unreliable
Careful	_   _   _   _   _X_   _   _   _	Careless

- ▶ Semantic differential requires extensive pre-testing before it can be put into actual research.

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## Stimulus Centric Scales

### 2. STAPEL SCALE

- A modification of the semantic differential scale
- Is an even numbered non-verbal rating scale used in conjunction with a single adjective
- Measure both intensity and direction of response
- Example: how would you rate BATA Stores on “cleanliness”



### 3. MULTI-ATTRIBUTE MODELING

- Proposed by Martin Fishbein in 1967
- Uses mathematical model (usually linear model) to interpret a persons attitude on a particular aspect

$$A_o = \sum b_i \times w_i$$

Where:

$A_o$  is the respondent's overall attitude towards some object

$B_i$  is the respondents strength of belief on an attribute

$w_i$  is the weight associated with the strength of belief

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## Response Centric Scales

### CUMULATIVE SCALES

- Consist of a set of items on which the respondent indicates agreement / disagreement
- Based on the pattern of response - respondent preferences are ascertained

### SCALOGRAM ANALYSIS

- Developed by Louis Guttman in 1958
- Builds on the cumulative scale and tries to develop a pattern of “pre-determined responses” by scaling both respondent and responses

### MULTIDIMENSIONAL SCALING

- An advancement over Cumulative and Scalogram Analysis.
- Tries to determine consumer preferences on more than one dimension simultaneously
- Extremely difficult to develop administer and interpret

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## Limitations of Scaling Procedure

- ▶ **Most scales measure attitudes along a single dimension**
  - ▶ Human beings are more complex and are normally exposed to more than one stimuli - product features, price, package design, advertising, brand name etc
- ▶ **Scales fail to measure the extraneous influences**
  - ▶ Purchase decisions may be made because of pressure from boss etc. Under such issues - and especially in areas on high involvement goods - scales and measurement may fail completely
- ▶ **It is difficult to develop “useable measures” from scales**
  - ▶ For example, question on “intention to buy” may not be indicative of market share in the next 6 months
  - ▶ There still exist a divergence between “what scales can capture” and “what market research can deliver”

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# THANK YOU

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## QUESTIONNAIRE DESIGN

### 6.1 Introduction

Every stage of marketing research is important but the most important stage is the designing of questionnaire since if the questionnaire design is faulty then no amount of clever interviewing, analysis and interpretations can provide meaningful answers. Questionnaire is the basic research tool and can be defined as *collection of a formalized set of questions — drawn up with the research problem in mind — used for obtaining information from the respondent for finding solutions to the research problem.*

The various steps in questionnaire design can be classified as follows: (i) Identifying constructs to be measured (ii) Preparing the questionnaire flow (iii) Deciding the type of questions (iv) Wording and writing the questions (v) Piloting the Questionnaire (vi) Administering the questionnaire. The problems of analysis and reporting is outside the scope of this article and shall be discussed in details. However, to provide a standard structure to the report, a report outline is provided in Appendix ?? (see page ??)

### 6.2 Construct Identification

The first and the most basic step in designing a questionnaire is to list down the specific information required to find the answers to the marketing problem. Many people assume that once they have understood the problem they can start making the questionnaire. Understanding the problem is easy; however identifying the constructs (or what are the set of questions that need to be asked) is hard. Constructs can be defined as the *set of attributes that needs to be measured to provide meaningful answers to the question in context.*

Take the parable of blind men and the elephant. The man who got hold of the tail described it as a long, thin and hairy animal. The man who got hold of a leg defined it as round and thick animal. The person who touched the ears defined elephant as huge, thin and fan-type animal. All were correct — but all were wrong.

They were correct because the construct they measured (or rather felt) were parts of the whole elephant but without any idea of what constitutes an elephant they gave the answers to the best of their ability. Similar is the problem faced by the market researcher. Unless he has a very clear cut idea of what constitutes the research problem (the elephant) he will not be able to develop measures and features to define the whole elephant.

Take the question “*identify market structure*”. For an economist the problem is extremely easy - if there is only one firm in the market then the market is monopoly; if there are two firms, then the market structure is duopoly; if there are 3-8 firms present then there is oligopoly and if more than 8 firms are present then we have competition. However, as soon as the question lands into the hands of the market researcher - the complexities begin to emerge. The company asking for market structure information obviously knows — with a fair degree of accuracy — the number of companies that are present in the market and they want more than just the number of companies as the answer. So what should a market researcher try to measure? Should he measure the total turnover? Should he measure the degree of price elasticity or should he develop completely new constructs to capture essence of the question. The thing to keep in mind is that in marketing research, the questions that need to be asked are extremely sensitive and dependent on the formulation of the problem and the choice of the respondent segment. Questions (and consequently the constructs) about reasons for buying an air-conditioner would differ greatly from buying an air cooler. Even though both the products perform the same service of ‘providing relief from heat’ the buying decision drivers are distinctly different in both the cases.

Developing constructs - or what should be measured and how - requires time, patience and a good grasp of the marketing research problem in hand. Before jumping into identifying the constructs, it may be well worth to spend some time on understanding the various aspects of the problem, the product in hand, the company, the competitors and other areas of interest. After the search is over, the next step is to “search-through” the available information to identify: (i) What are the measures that are currently in use – either defined in some other study and/or based on common conception of the market (ii) Why were these measures defined – was it to provide the same kind of answers that the current study is looking for or was it for a completely different purpose. (iii) How are the measures defined – what are the factors that have been used to define these measures (iv) Can these measures be used in the current study? (v) What do we need to modify in these measures to achieve the research objectives.

### **6.3 Questionnaire Flow**

The second stage is to prepare the questionnaire flow. The technique of “Flow Chart” — borrowed from information technology — comes in extremely handy. The questionnaire flowchart is a powerful tool - which graphically (or otherwise)

outlines the sequence in which the questions need to be asked. It is a comprehensive material detailing not only the sequence in which the questions would be asked but also the constructs and scales used for measuring the various attributes under study. The questionnaire flowchart needs to take care of the following three main processes — **sequencing, routing and skipping** — of the questionnaire design.

### **Sequencing**

Sequencing details the order in which the questions would be asked to the respondent. In order to make the questionnaire effective and to ensure quality to the responses received, a researcher needs to pay a lot of attention in preparing the questionnaire. A proper sequence of questions considerably reduces the chance of individual questions being misunderstood. The question sequence should be clear and smooth moving, meaning that the relation of one question to another is readily apparent to the respondent. If necessary, the questionnaire may be segmented into sections — each section dealing with a specific area of investigation. Although questionnaire design depends on the problem in hand, a broad outline of the segment of a questionnaire can be identified as follows:

1. **Control Information** In market research studies it becomes necessary to have certain information that help identify the respondent and provide a means of rechecking whether correct sampling procedures have been followed by the investigator or not. It generally constitutes of (i) Questionnaire Serial Number (ii) The Ward / Area Number (iii) The Starting Point Address / Number (iv) The Name of the Respondent (v) The contact information - address, phone number etc. - of the respondent (vi) The Investigator's Name and Code (vii) Other Field Control Information as necessary.
2. **Introduction** This forms the start of any questionnaire. It is a small paragraph — in which the investigator introduces himself to the respondent and solicits time from the respondent to participate in the interview process. The normal wordings of an introduction — which have almost become standardized across market research industry — is as follows:

“Good ..... (MENTION AS APPROPRIATE). I am ..... (SAY YOUR NAME) from .....(SAY COMPANY'S NAME) - a leading market research organization of the country. From time to time we conduct studies on a variety of product and services. Currently, we are doing a survey about .....<sup>1</sup> and we shall be grateful if you could spare us some time to answer the questions. We assure you that as per the norms of marketing research your answers would

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<sup>1</sup>This blank is usually filled up with the generic product category. For example if the survey is for distemper paints then we can say “... a survey about paints”

be kept strictly confidential and only reported to the client on an aggregate basis. Thank you very much for your cooperation”

3. **Eligibility Questions** These are put at the beginning of the questionnaire to allow investigator to quickly establish the eligibility of the respondent. For example, if our target audience consists of “individuals who have completed Post Graduation (PG) before 1999”, it would be worthwhile to check the following — (a) Highest education level of the respondent and (b) year of completing the highest education level — at the start of the interview. This will allow us to establish whether the person is eligible for the interview or not. Otherwise after the interview is over, we may discover that the respondent is currently studying in PG or has passed out of PG in 1999 — thereby invalidating the interview; and leading to a waste of time and money.
4. **Warm Up Questions** The set of questions that follow the Eligibility Questions are of particular importance because they are likely to influence the attitude of the respondent and establish the degree of cooperation with the respondent. These questions are framed with the following objectives in mind: (i) easy to answer (ii) establish the respondents cooperation (iii) arouse respondents interest and (iv) lead up to the main questions.
5. **Main Body** This consists of a set of questions, which have been designed to elicit the desired information pertaining to the research problem in hand.

Care should be taken to maintain the sequence of the questions within the Main Body. Questions which are easier to answer should be asked first, followed by questions that become progressively harder to answer. Two specific advantages result from using this strategy: (i) The respondent feels ‘morally’ bound to respond to the remaining questions and (ii) The respondent is more focused thereby provides better answers. However, opponents of this approach claim that it is best to ask the harder to answer questions first, because the respondent is ‘fresh and eager’ to provide answers. As the interview progresses ‘interview fatigue’ sets in and distort the respondents answers. The researchers task is to determine whether he would like to use the “easy-to-hard” or “hard-to-easy” approach while designing the questionnaire.

If the number of areas to be covered is more, it is again worthwhile to break up the main body into several sections. For example, if we are trying to find out about the consumer perception, overall opinion and price reactions for a certain product; the main body of questionnaire could be broken up into three distinct parts - (i) Overall Opinion (ii) Consumer Perception and (iii) Reactions to Price. It may also be worthwhile to have a small *Section Introduction* — which helps the respondent to re-orient himself to the new section. “Section Introduction” should be kept as small as possible - big enough

to reorient the respondent but small enough not to reveal anything. For example, the following could well serve as the section introduction for section III of our hypothetical study "Let us now talk about price".

6. **Classification Questions** These set of questions are used to classify and segment the respondent and usually cover the following five areas (i) Age (ii) Sex (iii) Monthly Household Income (iv) Whether the respondent is the Chief Wage Earner(CWE) or not (v) Highest Education Level of the CWE and the respondent and (vi) Occupation of the CWE and the respondent<sup>2</sup>.

There may be many more classification questions, but the six listed above are extremely important and should always be included because they constitute the basic. *demographic* information.

### **Routing & Skipping**

Routing refers to the questionnaire sequence that would be followed by the person administering the questionnaire based on certain conditions being fulfilled. Skipping, a terminology interconnected with routing, refers to the system of not asking certain questions depending on the answer to the previous question.

Take a look at the - Sample Questionnaire 1 (*see page ??*) - which shows a hypothetical questionnaire. Line numbers have been appended to the questionnaire at the extreme left for better clarity. The questionnaire will be used to identify and elucidate further principles of question design. Line numbers 03-04 provide an example of routing instruction, whereas line numbers 28-31 are examples of skipping instruction.

## **6.4 Types of Questions:**

Essentially all marketing research questions can be grouped into two broad heads -**Open Ended** and **Close Ended**.

### **Close Ended Questions**

In most of the cases, an investigator who has enough familiarity with the subject — or with a degree of secondary research and using logic — can build up a list of possible responses expected from the respondent with a high degree of accuracy. Take a look at the hypothetical questionnaire. Assuming that the respondent owns a mid size car, the possible response to the Q 2 can be well covered by the list of cars given in the sample questionnaire.

Under such a circumstances it may be worthwhile to use the given list of mid sized cars throughout the survey to provide standard set of responses. Using a

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<sup>2</sup>If the CWE/Respondent has retired then we ask about the occupation just prior to the retirement

previously defined set of responses allows all the investigators to use a uniform recording style and in the process minimize influence of the investigator bias on the responses. Questions which carry with them a list of preselected responses are called **closed ended** questions. Qn. 1, 2 and 3 in 'Sample Questionnaire 1' are examples of close ended questions.

Closed ended questions can be further divided into two parts - **Single Code** and **Multi Code**. The list of preselected responses attached with a *single-code* question are mutually exclusive of each other. Or in other words only one valid response is possible for a single code question. Take a look at Qn. 1 of the 'Sample Questionnaire 1'. The person contacted can either own a car (Response: Yes) or he does not own a car (Response: No). No other response is possible.

In the case of *multi-code* questions, the list of preselected response is not mutually exclusive. Or in other words, more than one valid responses are possible. Take a look at Qn 2 of the 'Sample Questionnaire 1'. In the best case scenario, the respondent can recall all the thirteen car names which we have listed, thereby providing us with thirteen valid responses. In the worst case scenario, the respondent may be able to recall the name of only one car - namely the car he owns. In the normal course of events, most respondent will recall between 1 and 13 names which can be easily captured in the questionnaire.

Framing a multi-code question carries with it certain problems - (i) How to capture more number of responses than allowed for and (ii) Which question(s) should be denominated as single or multi-code.

Let us deal with the first problem. The respondent may, in fact, recall more than 13 car names that we have provided for. To capture the "extra responses" — which is information over and above desired by us — provision should be built in the questionnaire. This is done by providing the category *Others*. The researcher has to take a call as to the number of *Others* to include in a question. It is common practice to provide for 5-6 *Others* space and save time. This approach may work well if the numbers of *Other* responses generated are low. However, if the number of *Other* responses is large; analysis, tabulation and interpretation becomes problematic.

Take a look at Q 3. of our sample questionnaire. Common sense tells us that a respondent may very well own more than one car, and if such is the case then Q 3 will fail to capture all the cars owned by the various respondents. One way of tackling the problem would be to break up Q 3 into two distinct parts as follows.....

Q 3a. Which all mid sized cars do you own? MULTI CODE

Q 3b. ASK ONLY IF MORE THAN ONE CAR OWNED ELSE CODE THE  
RESPONSE IN Q 3A AS THE RESPONSE IN Q 3B AND GOTO Q 4  
Considering everything, which car do you use most often?  
SINGLE CODE

..... and continue the interview based on the car coded in Q 3b. The second method would be to use the question as given in our hypothetical questionnaire,

but provide instructions to the investigators — that if the respondent owns more than one car then the car used most frequently should be recorded as the answer in Q 3.

It is the researchers job to determine whether to designate a particular close ended question as multi code or single code. Practice, understanding of the research problem, the constructs desired, time, length of the questionnaire etc. all go into determining whether the question is to be a single or multi-code. The best maxim to follow in this case - “when in doubt, go out and ask a few possible respondents”

### **Open Ended Questions**

Open ended questions essentially are used to elicit a free response from the respondents. At times it is not possible to anticipate the set of possible responses for a given question. Questions which try to elicit qualitative aspects — like moods, fears, emotions, ethos, cultural influence etc. — generate different responses among different respondents. Making these sort of questions as close ended will not allow us to capture the full range of responses. Side by side there are questions for which the set of possible responses can be anticipated - but the list is so huge that it becomes unwieldy to administer and/or include into the questionnaire. Under such a situation it may be prudent to leave the question as an open ended question — as we have done with our Q 4 in the sample question.

However care should be taken to limit the number of open ended questions in a quantitative exercise. Analysis of open-ended question require special care and understanding - specially when it has been generated as a part of a quantitative exercise. If the number of open ended questions are relatively large — then it may be worthwhile to re-investigate the research problem. Either the researcher has not understood the problem in hand or he is using quantitative study where a qualitative study is required.

## **6.5 Writing the questionnaire**

After the questionnaire flowchart is complete and the type of questions decided on, the next task of writing out the questionnaire begins. However, before we start writing down the questions we should remember the fact that questionnaire is instrument through which the respondent is made to reveal his/her knowledge, attitudes and perceptions, behaviors, likes and dislikes etc. In other words - the respondent is doing a favor to the researcher by revealing these information and as such maximum care should be taken to avoid generating any stress for the respondent. The do's and don't's of framing a question are given in section 6.5 (*see page 76*).

The most basic task of the investigator is to ensure that the questionnaire is being administered to the relevant respondent. This should be done by establishing

eligibility of the respondent as early as possible - to avoid wastage of the investigator's time. The criteria that a respondent should match to be eligible for the interview are known as **eligibility criteria**. If, for example, the target segment is owners of car then it would be much better to establish ownership of the car at the earliest. Line no 04 of the example questionnaire eliminates those respondents who do not own a car.

## **Contact & Main Questionnaire**

In case the number of eligibility criterion to match are more than one — it may be worthwhile to split the questionnaires into two parts. The first part, called the **contact questionnaire**, contains all the questions that are needed to establish eligibility of the respondent for the main interview. The **main questionnaire**, on the other hand, contains the questions — answers to which will provide solutions to the problem at hand.

Listing questionnaire also perform a very important task. They help in maintaining the randomness in any marketing research process. For example, assume that we need to identify the percentage of car owners in a particular locality. For the sake of simplicity let us further assume that we decide to base the answer on a sample 30 residents of a particular PIN code zone. One of the methods of solving the problem would be to approach 30 people whom we think will own a car. Suppose the investigation reveals that 27 people own a car. Would that imply that 90% of the people own a car? Statistically speaking the inference 'that 90% own a car' cannot be drawn as there was not well identified sampling procedure used to conduct the study.

Another method would be to administer a contact questionnaire to 30 respondents of the locality in such a manner that the investigator knocks on every 5th door from a given starting location. If the resident owns a car then the main questionnaire is administered; otherwise the investigator moves off to the next house after skipping 5 houses. Now suppose you get a result that 21 residents own a car. The result 'that 70% of the people own a car' would be admissible statistically because in doing so we have inadvertently followed the steps of systematic random sampling.

## **Phrasing the Question**

### **Problem of word sequence**

The most vital task is to word the question correctly - because even a small misspelling or change in the position of words can change the meaning of the question that is being asked. Take a look at the following examples:

Q 1a. Agree or Disagree - "The government should actively support social security measures"

Q 1b. Agree or Disagree - “The government could actively support social security measures”

The above two questions differ on a single word — should and could. But the difference is enough to change the meaning of the sentence. In the former case an assertion is being made and in the latter case a possibility is being explored. Majority of the respondent would say yes to the former than to the latter.

Q 2a. Agree or Disagree - “Students should study hard before the exams”

Q 2b. Agree or Disagree - “Students should study hard only before the exams”

The above two questions differ on the inclusion or exclusion of the word ‘only’. Asked to students almost 100% would agree with the first statement whereas almost everyone would disagree with the second statement; in spite of the fact that a large majority of students actually follow the behavior pattern highlighted in Q 2b. The reason can be found in human psychology. Human beings do not want to admit their bad traits and therefore will automatically disagree with the second statement.

Q 3a. Comment - “Should we dissolve our difference with Pakistan”

Q 3b. Comment - “We should dissolve our difference with Pakistan”

Question 3a and 3b contains the same words — but differ in the arrangement of words and in the process change the meaning of the sentences. Q 3b would generate a vehement NO from a large segment of Indian citizens, whereas Q 3a would generate a lot of debate without giving a concrete answer.

The above three examples should be enough to convince a researcher about the importance of wording a question. A wrongly worded question, a misspelling, a change in the word sequence — can change the whole complexion of the problem and negate the whole research exercise. Extreme care should be taken to word the questions. Care should also be taken to avoid certain other practices - which are detailed below.

### **Don't's of framing a question**

**Avoid unfamiliar words** Words which are not familiar to the respondent, jargon, difficult words should be avoided as much as possible. For example “*Do you think that CORBA model is better than COM?*”. Respondents unfamiliar with Information Technology will have no idea as to what is CORBA or what is COM. Even people working in IT industry may find it difficult to answer the question as CORBA and COM are specialized technologies which are not used on a day to day basis.

But yes, if the sample is of highly educated specialist in a particular field; then the jargon specific to that industry may be used — as it provides a standardized reference frame.

**Avoid many things in one question** A question like “*What to you think of liberalization, privatization and globalization?*” asks the respondent to evaluate three things — liberalization, privatization and globalization — at one go. Even hardened economist will have problems in answering the question; forget the man on the street.

It would be better if the question was broken up into three distinct questions. Breaking up would allow the respondent to focus on one question at a time and thereby provide a more lucid and meaningful response.

**Avoid asking complicated questions:** Take a look at the following question: *What would you think would you rather have in the way of lather, a low level of lather which would give less cleaning power but would be easier to rinse away, or a high level of lather which would give more cleaning power but would be harder to rinse away?* — a question actually asked in a survey. Chances are you would have to repeat the question more than 5 times just to make the respondent understand what is being asked.

If it becomes necessary to ask such a complicated question, it would be better to break up the question into smaller individual parts. Alternatively visual clues<sup>3</sup> can be provided. For the above question we can design a card as follows:

Concept	Amount of Lather	Power of Shaving	Ease of Rinse
A	LOW	LESS	EASY
B	HIGH	MORE	HARD

With the cue card being shown to the respondent, the corresponding question becomes much easier “Do you prefer concept A or do you prefer concept B?”. The cue card also allows the respondent to keep focus on the complicated concept and thereby provide more meaningful answer.

**Avoid double negatives** Another very common practice is to use double negatives in a question. Negation is an extremely powerful tool in mathematics, statistics or other sciences but for a respondent it poses a double hurdle. Consider “*Would you rather not use a non-medicated shampoo?*” First the respondent has to figure out what is a medicated shampoo. Then he has to figure out the term

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<sup>3</sup>Known as ‘cue cards’ or simply ‘show cards’ in marketing research terminology. Use of cue cards is also suggested for multi code questions

non-medicated shampoo. Then he has to figure out the reasons for using a non-medicated shampoo. Finally he has to negate the reasons to give a meaningful answer to your question.

It would be much better to ask "Would you prefer to use a cosmetic shampoo?" - Simple, direct and easy to answer.

**Avoid abstract concepts** Introducing abstraction provides an easy way of passing the burden of response to the respondent. However in doing so a researcher inadvertently builds a base for non response which may prove fatal at the time of analysis. Consider "What do you think of the state-of-the-art production facility of XYZ limited located in Maharajnagar?" First level of abstraction — what is the meaning of state-of-the-art? Is using up to date technologies "state-of-the-art" or does it mean use of extremely advanced technologies? Second level of abstraction — What is the state-of-the-art technology in production of products manufactured by XYZ Ltd? Third level of abstraction — Does XYZ Ltd. has a production facility at Maharajnagar. Furthermore I have never visited the production facilities of XYZ Ltd at Maharajnagar, so how do I provide you the answer?

Again it would be better to use cue cards. However, cue cards may not provide the desired answer in the above case; because the normal man on the street will have no idea as to what constitutes the state-of-the-art technology in production of the product. It may be better to ask for the opinion of the respondent. Or even better to drop such questions.

**Avoid vague concepts** Another quick method of passing the buck on to the respondent is to ask him vague concepts. "*Do you think that your house is the right sort of house for your family?*" What is meant by the term "Right Sort". Do you mean to say whether my house is comfortable to live in? Or do you mean that every member of my family has a room of his own? Or do you mean that ventilation is proper? Or are you asking me about the architecture of the house?

The above question also shows the sloppiness in construction of a construct. Probably the client said that we want to make the 'right sort' of house for our customer; and the researcher without bothering to figure out what 'right sort' means passed on the burden of interpretation on to the respondent. A number of different attributes may contribute in making a house the 'right sort' of house. The level of comfort, roominess of the house, layout of the house, quality of construction, quality of neighborhood, quality and quantity of essential utilities like water, electricity etc. and value for money. It is the researchers job to drill down and find out what does a phrase actually means. Once the meaning is clear, it becomes easy to frame the constructs and provide meaningful answers. A composite index composed of the 8 attributes listed above would be a better indicator of 'right sort' of house than just the phrase 'right sort'.

Table 6.1: Recalling Product Purchase

Product	Example	Time frame
Super FMCG	Cigarettes	1-7 days
FMCG	Soaps	7-30 days
Low Cost CDG	Cassettes	1-3 Month
Medium Cost CDG	Walkman	3-12 Months
High Cost CDG	Television	1-3 Years
Low Priced Assets	Cars	3-5 Years
High Priced Assets	Home	> 5 years

**Avoid Futuristic Question** Another variation on the same theme is asking the respondent impossible to answer questions. Consider the question *“How long do you think will your current tennis racket will last?”*. The tennis racket may break the next day or it may last me a lifetime. There is no way in which a meaningful answer can be provided. Impossible to answer question forces the respondent to fall back on the arcane art of prediction — as the respondent has no reference point to go by.

Re-framing the question to *“How long did your previous tennis racket last?”* will provide more meaningful answer; whose analysis can and do provide good indicators of the life of the racket.

**Avoid mathematical concepts** Mathematical concepts in the questionnaire may also tend to make the question impossible to answer or vague. Questions with the term — on an average — are repeatedly asked in various marketing research exercises. Like *“On an average how much did you spend on clothing last year?”*. In doing so we are forcing the respondent to evaluate his past behavior and then apply the arithmetic concept of mean to provide a meaningful answer. Even if the technique works with an erudite urban respondent; responses received from semi literate respondents would be of no practical use because of the inherent vagueness of the response. Responses like “I guess around 1000 - 2000 Rs. or thereabouts” are common. The investigator is forced to judge the veracity on the spot. Should he record Rs. 1000 or should he record Rs. 2000 or should he record the average i.e. Rs. 1500 or should he record any arbitrary figure between Rs. 1000 and Rs. 2000?

If such a question needs to be asked, then it would be better to stick to a clearly defined time frame and to divide the question into distinct parts. The above question may be broken into three parts (i) which all articles of clothing did you purchase last month and (ii) what was the amount of quantity of such article purchased and (iii) what was the price of such item(s). An argument can be raised that ‘last year’ is also a well defined time frame. Admitted, but can you recollect which all clothing did you purchase in the last one year? If no, then why expect the

guy on the street to remember. A rule of thumb for deciding time frame is given in 6.1 (*see page 79*).

**Avoid generalization** Related to the above is the problem of generalizing. Research exercises tend to ask questions which relate to the general pattern of behavior and attitudes. Given the fact that modern methods of marketing rely heavily on behavioral aspects the questions on behavior and attitudes tend to make their way into the questionnaire. “*What do you usually do after returning home from office?*” or “*What do you do on holidays?*” may not provide the behavioral pattern that the marketer may be looking for. If the behavioral pattern is fixed (or relatively fixed) then the chances of identifying the correct behavioral pattern increases. But if opposite is the case — then the chances of identifying the correct behavioral pattern decreases and chances of impressions creeping in increases. The former question has a higher chance of being answered correctly than the latter. In such a situation it may be preferable to ask the behavioral pattern question with a fixed time frame which provided an anchor to the respondent and allows him to increase the accuracy of the response by having a pre-identified frame of reference. Or in other words — it may be better to ask “*what did you do on last Sunday?*”

## 6.6 Final Steps

### Piloting the Questionnaire

After designing the questionnaire comes the most vital task of piloting the questionnaire. Piloting refers to the technique of administering a few questionnaires to a small set of target respondent with a view of finding out whether the questionnaire is doing its job or not.

Special attention is placed on wording and figuring out whether it is conveying the correct meaning or not. If a vernacular translation has been done, then care should be taken that the vernacular version of the question asks the same thing as the English one. Translation goof-ups can completely jeopardize a research study. Another area that should be looked into is whether the multicode questions are generation the responses within the pre-coded response set or not. If majority of the respondent provide responses that get coded as Others then probably the response set is inaccurate and may need a lot of reworking.

Attention should also be paid to the constructs. A few analysis should be carried out to see whether the constructs are providing the desired information or not. If latter is the case, then constructs would need to be reworked. Time taken to administer the questionnaire should also be carefully monitored - both in the aggregate sense and for individual questions. If individual questions take a long time to be answered, then the reasons for the delay should be identified and rectified. If the overall time taken for the interview is more than 60 minutes, then chances of getting accurate responses towards the end decrease dramatically. Respondents are overcome with ‘interview fatigue’ and they just want to get over with it. Also,

long questionnaire tends to bring down an interviewer productivity - as the number of interviews that can be done in a working day or 8 hours fall. To boost their productivity, interviewer may well resort to unfair means to fill in their daily quota of questionnaire. In such a case the questionnaire may need to be reworked to bring down the interviewing time. On the other hand if time cannot be cut down, then a shuffling of sections may be required to average out bias due to fatigue. Suppose, that a long questionnaire has two sections - A and B. It would be better to administer sequence A-B to 50% of the respondent and the sequence B-A to the remaining.

After all the changes, suggestions etc have been incorporated, it is recommended that the piloting exercise be carried out again, and again - until and unless the researcher feels confident of the questionnaire and all the problems have been ironed out.

Piloting is crucial if the research is carried out on a large scale and/or across the country — as because once the green light has been given enormous amount of time, money and energy is wasted to rectify an error that went unnoticed. Some researchers tend to conduct pilot exercise on approximately 10% of the total sample size. However the size of the pilot is not so critical — but the process is. A pilot exercise conducted fairly and squarely will reveal lots of problems — rectification of which will make the whole research exercise more richer.

### **Administering The Questionnaire**

After the final alterations and re-piloting, the questionnaire is ready to be administered. In case the interviews are to be carried out by investigators - or persons other than the researcher - a detailed guideline<sup>4</sup> should also be prepared and sent along with the questionnaire. This guideline takes up each question and explains in detail (i) how the question needs to be asked (ii) how the responses are to be taken down (iii) how to handle unexpected responses etc. The briefing note also clarifies in detail the sampling procedure, target respondent, and other logistical schedules - like dispatch, last date of completion etc. The main aim of the guide is to uniformity in respect of all salient points in the study

It must be remembered by the person administering the questionnaire that interviewing is an art and one learns it only by experience. However if the following points are kept in mind then eliciting the desired information becomes much easier: (i) Approach must be informal and friendly. the interviewer should greet the respondent and explain the purpose of the interview (ii) Proper rapport should be established between the interviewer and the respondent; people are motivated to communicate when the atmosphere is favorable (iii) Interviewer must develop the art of listening and must show interest, respect and curiosity towards the responses of the respondent. However he should not lose sight of the fact that he

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<sup>4</sup>Also called the 'Questionnaire Briefing Note'

has to fill up the questionnaire, and therefore should be able to guide the communication without interfering, interrupting and without giving offense.

## 6.7 Summary

In sum, designing questionnaires is an art form of the highest level. It involves a lot of things starting with the researchers ability to research and understand the problem, drawing up the questionnaire and finally administering it. **Questionnaire design cannot be learned in a day and neither can a questionnaire can be drawn up at the drop of the hat.**

To develop an effective questionnaire the researcher has to do a lot of work and has to keep in mind the following salient points: (i) The researcher must be clear about the various aspect of the research problem he is trying to solve — because the research problem forms the basis on which the questionnaire is drawn (ii) Appropriate forms of question depend on the nature of information that is being sought, the target audience in question and the kind of analysis intended. Questions should be simple, easy to understand and must be constructed with a view of their forming a logical part of a well thought out tabulation plan (iii) Rough draft(s) of the questionnaire should be prepared, giving due thought to appropriate sequencing, routing and scheduling of questions. Drafts should be thoroughly re-examined and revised repeatedly until and unless the researcher is confident that the questionnaire is going to provide him the answers he is looking for (iv) Questions should be worded with care. Special emphasis should be laid on keeping the questions simple and straight-forward, so that the respondents do not have any difficulty in understanding and answering the question (v) Pilot study should be undertaken for pre-testing the questionnaire. The questionnaire should be edited in the light of findings of the pilot study.

Designing questionnaires requires patience. It requires the ability to analytically analyze problems, devise measures to measure the problem. It requires the ability to play with words, to understand the fact that what is communicated is not always what is decoded. To look through the initial stage and figure out what type of analysis to do and therefore what kinds of questions to include. To work, re-work, revise and re-draft or even junk, the questionnaires based on the outcomes of the pilot study and the ability to suppress own opinions and listen to the ranting and ravings of - on hand the client and on the other the respondent; for the sake of the research study.

In the end - one must remember that “a well done questionnaire, is like completing eighty percent of the research study”

## SAMPLING AND SAMPLE SURVEY

### 7.1 Introduction

In any investigation the interest generally lies in the assessment of general magnitude and the study of variation with respect to one or more characteristics relating to the individual belonging to a group. This group of individuals under study is called **population** or universe. Thus population is an aggregate of objects — animate and inanimate under study. The population may be either finite or infinite.

It is obvious that for any statistical investigation of the full population is rather impracticable. For example, if we want to know the monthly household income of the people in India, we will have to investigate all the earning individuals in the country — which although very much possible is almost impractical. If the population is infinite, complete enumeration is not possible. Also if the units under study are destroyed under the course of investigation — life of bulbs, explosives etc. — 100% inspection though possible is not desirable. But even if the population is finite or the inspection is non-destructive, 100% inspection may not be possible because of administrative, time and financial causes. In such cases we take help of Sample. **Sample** can be defined as the finite subset of statistical individuals in the population and the number of individuals in the sample is called the sample size.

For the purpose of determining population characteristics instead of investigating the entire population, the individual in the sample are only observed. Then the sample characteristics are utilized to approximately determine the population. For example, on examining the sample of a particular stuff we arrive at a decision of purchasing or rejecting that stuff. The error involved in such approximation is known as **sampling error**, and is inherent and unavoidable in any and every sampling scheme. But sampling results in considerable gain in time and cost, not only in respect of making observation about the population, but also in subsequent analysis.

## 7.2 Some Common Terms

### Parameter and Statistic

**Parameter** refers to the statistical constants of the population and **Statistic** refers to the statistical constants of the sample. In normal practice, most of the time, population parameters are not known and their estimates based on sample values are used. Thus statistic may be regarded as an estimate of parameter. The statistic generated is a function of the sample values only. From any given population, many samples can be drawn. For example the number of all possible samples of size  $n$  that can be drawn from a finite population of size  $N$  is  ${}^N C_n$ . For each of these samples we will get different means say  $m_1, m_2, \dots, m_n$  which will vary from sample to sample. From one of these means  $m_i$  (called the statistic) the researcher will conclude about the population mean  $\mu$  called the parameter. The problem of determining the parameter from the statistic is the “Theory of Estimation” and the accuracy of a statistic to be representative of the parameter is the “Theory of Testing of Hypothesis”.

### Standard Error

A statistic  $t = t(x_1, x_2, \dots, x_n)$  which is a function of the sample values  $x_1, x_2, \dots, x_n$  is said to be an unbiased estimate of population parameter  $h$  if  $E(t) = h$ .

The standard deviation of the sampling distribution of a statistic is known as the *sample error*. The standard error (SE) plays a very important role in the theory of large samples and forms the basis of testing of hypothesis. If  $t$  is any statistic, then for large samples, we have:

$$\begin{aligned}\Rightarrow Z &= \frac{t - E(t)}{\sqrt{V(t)}} \text{ follows } N(0,1) \\ \Rightarrow Z &= \frac{t - E(t)}{\sqrt{SE(t)}} \text{ follows } N(0,1) \\ \Rightarrow |t - E(t)| &\leq 1.96 SE(t)\end{aligned}$$

For 5% level of significance (i.e.  $H_0$  is accepted)

Thus, the magnitude of standard error gives an index of precision of the estimate of parameter. The reciprocal of the standard error is taken as the measure of precision of the sample.

## 7.3 Census vs. Sampling

Whenever it is possible to survey the entire population, we conduct *complete enumeration* or *census*. Given a choice between census and sampling, it is always preferable to conduct a census — because the results of census are always true for the

<b>Census</b>	<b>Sampling</b>
Ideally a census should be performed provided all information is collected with minimal cost	If the population is large cost considerations do not permit census, then a sample is useful
It is time consuming and very slow process. By the time a census is completed the earlier collected data may become redundant	It is a speedy and quick process and guards against information redundancy
Cost per unit of information is low, but the total cost is substantially high. So is the effort required	Cost per unit of information is comparatively high, but total cost is comparatively low and effort required is substantially low
It cannot be used on a destructive population. For example to determine the average life-span of a bulb, all the bulbs produced have to be burned until nothing remains for sale	It is easily applicable on destructive population. For example the average life-span of bulbs could be determined by taking a sample without destroying the entire output
It does not allow control of non-sampling error	It allows effective control of non-sampling error
It does not allow the investigator to concentrate on individual cases	It allows concentration on individual cases and permits in-depth studies
Chances of elements of population dropping out is very high and cannot be controlled	There is a much lower chance of sample dropout and this can be controlled to a large extent
It is preferred when the population is small, the variation between the units is extremely high, cost of error is high, and the attribute of interest occurs rarely in a population	It is preferred when the population is large, the variability between units is low, cost of error is low and the attribute occurs frequently in population
It does not allow the usage of statistical hypothesis testing procedures	We can use statistical hypothesis testing to infer about population characteristics

Table 7.1: Census Vs. Sampling

entire population. But as already mentioned, it may not always be possible or practical to conduct a census.

Table 7.1 (pp. 85) give the major differences between census and sampling:

## 7.4 Principles of Sample Survey

The theory of sampling is based on the following principles:

### 1. Principle of Statistical Regularity:

This principle has its origin in the mathematical theory of probability. The law of statistical regularity states that a moderately large number of items chosen at random from a large group are almost sure - on the average - to possess the characteristics of the large group. This principle stresses the desirability and the importance of selecting the sample at random so that each and every unit in the population has an equal chance of being selected in the sample.

### 2. Principle of Inertia of Large Numbers:

An immediate derivation from the principle of statistical regularity is the principle of inertia of large numbers. Law of large numbers states that - "other things being equal, as the sample size increases, the results tends to be more reliable and accurate". This is because in dealing with large numbers the variation in the individual components tend to balance each other out and consequently the variation in the aggregate result become less.

### 3. **Principle of Validity:**

The principle of validity states that the choice of sample design should be such so as to obtain valid tests and estimates about the parameter of the population. It can be shown that following the principle of random sampling validity can be maximized.

4. **Principle of Optimization:** This principle impresses upon obtaining optimum results in terms of efficiency and cost of the design with the resources at our disposal. The reciprocal of sampling variance of an estimate a measure of its efficiency, while a measure of the cost of the design is provided by the total expenses incurred in terms of money and man hours. The principle of optimization consists of (a) achieving a given level of efficiency at minimum cost and (b) obtaining maximum possible efficiency with given level of cost.

## 7.5 **Types of Sampling Procedures**

The technique and method of selecting a sample is of fundamental importance in the theory of sampling and usually depends on the nature of the data and type of inquiry. The procedures for selecting a sample may be broadly classified under the following three heads:

**(a) Non Probabilistic Sampling Procedures:** In this process the sample is selected with a definite purpose in view and the choice of sampling units depends entirely on the choice and discretion of the investigator. The sampling units suffer from the drawback of favoritism and nepotism depending upon the belief and prejudices of the investigator and thus do not give a representative sample of the population. This sampling method is seldom used and cannot be recommended for general use because it is often biased due to element of subjectiveness on the part of the investigator. However if the investigator is experienced and skilled and subjective sampling is carefully applied then subjective sampling may also give valuable results.

**(b) Probabilistic Sampling Procedures:** Probability sampling is the scientific method of selecting samples according to some law of chance in which each unit in the population has some definite preassigned probability of being selected in the sample. The different types of probability sampling are (a) where each unit has an equal chance of being selected (b) where sampling units have different probabilities of being selected and (c) probability of selection of a unit is proportionate

to the sample size. These type of sampling procedures are commonly referred to as **random sampling**

Sometimes, because of practical considerations, samples are selected partly according to some law of chance and partly according to some fixed sampling rule without any probability assignment they are termed as mixed samples and such a sampling is know as *mixed sampling*.

Much of the sampling in market research in non probabilistic in nature. Samples are selected on the basis of the judgment of the investigator, convenience, or by some other non probabilistic methods. The advantage of probability sampling are that if done properly, it provides a bias free method of selecting sample units and permits the measurement of sampling error. Non probabilistic sampling offer neither of these features. In non probabilistic sampling, one must rely on the expertise of the person taking the sample — whereas the in probability sampling results are independent of the investigator.

It is not always necessary that probability sampling yields results that are superior to non probabilistic sampling, nor the samples obtained by non probability methods are necessarily less “representative” of population under study. Thus the choice of probability and non probabilistic sampling ultimately turns on judgment of relative size of error.

## **Non Probabilistic Sampling Procedures**

### **Quota Sampling**

This is perhaps the most commonly employed non-probability sampling procedure. Roughly described, in quota sampling the size of various sub classes (strata) in the population is first estimated from some outside source. Next the interviewer sets quota (or the number of interviews required) on certain basis of population. For example, consider the purchase of Saree - which contrary to popular belief has a high involvement of the head of the household usually male. In such a case the investigator may put a minimum number of quota for males that need to be interviewed. Say for a sample size of 100 - the interviewer may specify that a minimum of 30 should be males distributed according to Age Group and income (see table 7.2).

The same initial steps are applied for proportional stratified random sampling. The major distinction is that in quota sampling the investigator choose whom to interview, whereas in proportional stratified sampling the subjects to be interviewed are randomly assigned. As the interviewer judgment is involved - there is a large amount of bias involved. The advantage is that costs are low and it is pretty convenient.

### **Judgment Sampling**

It is also known as purposive sampling. The key assumption underlying this type of sampling is that with sound judgment and expertise and an appropriate strat-

Income (Rs / Month)	Age Group		
	18 to 25	26 to 35	> 35
< 7500	2	3	1
7501 to 12500	2	3	1
12501 to 17500	2	3	1
17500 to 25000	2	3	1
> 25000	2	3	1
Total	10	15	5

Table 7.2: Quota for Male Saree Buyers

egy, one can select elements in the sample so as to make the sample representative of the population. It is presumed that the errors in judgment will cancel out each other and give a representative sample. It has the same errors as that of quota sampling. The advantage is that it is low cost, easy to use, less time consuming and in the hands of an expert as good as probability sampling.

### **Convenience Sampling**

Convenience sampling is a generic term that covers a wide variety of ad hoc procedures for selecting respondents. For example - some cities may be viewed as having a demographic makeup as close to the national average and these cities may be used as test markets, Samples may be taken from predefined bodies like Parent Teachers Association, co-operative groups of respondents etc. all fall under convenience sampling. Convenience sampling means that the sampling units are accessible, convenient, easy to measure, co-operative or articulate. As a disadvantage it has huge sampling biases and should be used with care.

### **Snowball Sampling**

Also known as multiplicity sampling - is the name given to procedures in which the initial respondents are selected randomly - but where the additional respondents are obtained by references or by perusing the responses provided by initial respondents. One major purpose of snowball sampling is to estimate various characteristics that are rare in population. It is generally used to locate sub-populations of interest and once the sub-populations have been found normal sampling methods can be used.

## **Probabilistic Sampling Procedures**

### **Simple Random Sampling**

It is a technique for drawing a sample in such a way that each unit of the population has an equal and independent chance of being included in the sample. In this method an equal probability of selection is assigned to each unit of the population

at the first draw. It also implies an equal probability of selection any units from the available units at subsequent draw.

In Simple Random Sampling (SRS) from a sample of  $N$  units the probability of drawing any unit in the first draw is  $(1/N)$ , It can be shown that the probability of selecting a specified unit of the population in any give draw is equal to the probability of its being selected at the first draw. The selection procedure is using lottery system or random number tables.

One of the chief advantages of SRS is that since the sample units are selected at random giving each unit an equal chance of selection, the element of subjectivity or personal bias is completely removed. As such a simple random sample is more representative of the population as compared to subjective sampling. Furthermore, it becomes easy to ascertain the efficiency of the estimates of the parameters by considering the sampling distribution of the statistic. For example  $y_n$  as an estimate of  $Y_n$  becomes more efficient as sample size  $n$  increases.

On the limitations of SRS it can be said that the selection of SRS requires an up to date sampling frame — a completely cataloged population from which the samples are to be drawn. Frequently, it is virtually impossible to identify the units in the population before the sample is drawn and this restricts the use of simple random sampling. Secondly, a SRS may lead to administrative inconvenience. It may result in selection of sampling units which are widely spread geographically and in such a case it may become impractical to put into practice the simple random sampling procedures. Thirdly, at times, a simple random sample may give most nonrandom looking result. For example, if we draw a random sample of size 13 from a pack of cards, we may get all the cards of the same suit. However the possibility of such samples is extremely small. Finally, for a given precision, SRS requires a comparatively larger sample size as compared to other sampling procedures.

### **Systematic Random Sampling:**

A systematic random sampling is similar to simple random sampling with slight modifications. In systematic random sampling each sample element has a known and equal probability of selection. The permissible sample of size  $n$  that are possible to be drawn have a known and equal probability of selection — while the remaining sample of size  $n$  have 0 (zero) probability of selection. For example, if there are 600 members in a population ( $= N$ ) and one desires a sample of 60 ( $=n$ ), he calculates a sample interval  $= N/n = 600/60 = 10$ . A random number is then selected between 1 and 10 both inclusive. Say the random number selected is 4. Then the sample will constitute of 4th, 14th, 24th, . . . elements.

Systematic random sampling assumes that the population is ordered in some way. The ordering can be uncorrelated with the characteristic under study or it may be correlated. If the orderings are uncorrelated then systematic random sampling gives results close to random sampling. The major problem of systematic

random sampling is that the estimation of variance of the universe from the sample possesses problems.

The chief merit of systematic random sampling is that it is operationally more convenient than any other probability sampling procedures. Time and cost involved are relatively much less. Furthermore, Systematic random sampling can prove to be more efficient than simple random sampling provided the frame is arranged wholly at random and it can be applied with some modifications when certain sample units are missing.

However Systematic Random Sampling is not without demerits. The main disadvantage of systematic random sampling is that the sample drawn is not completely random. Secondly, If  $N$  is not a multiple of  $n$ , then the actual sample size is different from that required and the sample mean fails to be the unbiased estimate of the population mean. Thirdly It is not possible to obtain an unbiased estimate of population variance. This is a great drawback, since most of the hypothesis tests require estimates of population variance for testing. Fourthly, Systematic random sampling may yield highly biased estimates if there are periodic features associated with the sampling interval i.e. if the frame has a periodic feature and  $n$  is equal to or a multiple of the period.

### **Stratified Random Sampling**

It is sometimes desirable to break the population into different strata based on one or more characteristics and then a random sample to be taken from each stratum. Stratified random sampling is of two types - Proportionate and non-proportionate.

In *proportionate* stratified sampling, the sample that is drawn from each stratum is proportionate in size to the relative size of the strata to the population. If the population consists of  $N$  elements and we have  $k$  strata of size  $N_i$  ( $i = 1, 2, 3, \dots, K$ ) and if  $S$  be the desired sample size, then  $s_i$  i.e. the number of samples to be drawn from the  $i$ 'th strata is given by  $s_i = (N_i/N) * S$  for all  $i$ .

In *non-proportionate* stratified sampling the above formula is not followed and the investigator uses his own proportion of sample in each strata. As a rule of thumb, if variances amongst each stratum are equal then proportionate sample is used.

Stratified sampling gives increased efficiency over random sampling provided within stratum variation is small but between stratum variations are large.

### **Cluster Sampling**

Cluster sampling is one in which a simple random sample is selected of all primary sample units — each primary unit containing one or more sample unit. Then all elements within the selected primary units are sampled. For example — for a sample in the state of West Bengal, the primary selection unit could be districts. The

sample units could be the sub divisions. The advantage of cluster sampling is that the costs are low but reliability goes down.

### **Multistage Sampling**

Multistage Sampling, also known as Two-Stage sampling or Area sampling is nothing but the process of applying the method of cluster sampling more than once — once at the primary stage and then at the secondary stage.

Multistage sampling is more flexible than other methods of sampling. It is simple to carry out and results in administrative convenience by permitting fieldwork to be concentrated, yet covering large areas. It also allows huge cost savings when sampling is carried out over a large geographical area. It is of great practical use — especially in areas where developing a frame is either impossible or impractical.

However, multistage sampling is generally less efficient than suitable single stage sampling.

## **7.6 Sample Size Determination**

In theory, whenever a sample survey is made, there arises some sampling error, which can be controlled by selecting a sample of adequate size. Researchers will have to specify the precision that he wants in respect of his estimates concerning the population parameter. For instance, a researcher may like to estimate the mean of the universe within  $\pm 3$  of the true mean with 95 percent confidence. In this case we will say that the desired precision is  $\pm 3$  i.e. if the sample mean is 100 then the true population mean will be no less than 97 and no more than 103. In other words, the margin of acceptable error ( $e$ ) is 3. Keeping this view in mind now we can explain how sample size can be determined so that specified precision is maintained.

### **Sample Size with mean**

To explain the determination of sample size we need to take help of the theory of testing of hypothesis. It is well known that the null hypothesis  $H_0 : (\mu = \mu_0)$  is tested using the formula

$$Z = \frac{\sqrt{n}(\bar{x} - \mu)}{\sigma}$$

where  $\bar{x}$  is the sample mean which is calculated from the sample,  $Z$  is the value of the standard normal variate taken from the normal probability tables<sup>1</sup>,  $n$  is the size of the sample and  $\sigma$  is the standard deviation of the sample which is either known or is estimated from past experiments. Now, the difference between the actual value of  $\bar{x}$  and  $\mu$  is the error of estimation of  $\mu$  from the selected sample. Let us denote  $(\bar{x} - \mu)$  by the letter  $e$ . Then the above expression becomes

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<sup>1</sup>Normally for 95% confidence limit it is 1.96 and for 99% confidence limit it is 2.57

$$Z = \frac{\sqrt{ne}}{\sigma} \quad (7.1)$$

which on rearrangement of terms becomes:

$$n = \frac{Z^2 \sigma^2}{e^2} \quad (7.2)$$

Equation (7.2) is applicable when the population is infinite. Thus we can see that the sample size desired is dependent on two things — (a) the magnitude of error ( $e$ ) which is acceptable to the researcher and (b) the value of  $Z$  which is determined from the desired level of significance.

But in the case of a finite population of size  $N$ , the above formula will also incorporate the “*finite population corrector*” and the equation for estimating the sample size in finite population become:

$$n = \frac{Z^2 \sigma^2 N}{(N - 1)e^2 + Z^2 \sigma^2} \quad (7.3)$$

### Sample Size with Proportion

Using the theory applied above, we can also deduce the formula required for estimating the sample size when we are interested in measurement of proportion. Formula for infinite population is:

$$N = \frac{Z^2 pq}{e^2} \quad (7.4)$$

Where  $p$  is the sample proportion and  $q (= 1 - p)$  is the proportion of the sample in which the characteristic does not appear.

The formula for finite population is:

$$n = \frac{Z^2 pq N}{(N - 1)e^2 + Z^2 pq} \quad (7.5)$$

## 7.7 Steps in Conducting a Sample Survey

The main steps involved in the planning and execution of the sample survey may be grouped under the following heads:

1. **Objectives of the survey:** The first step is to define in clear and concrete terms, the objective of the survey. The objectives of the survey should be commensurate with the available resources in terms of money, manpower and time limit required for the availability for the results of the survey.

2. **Defining the Population to be sampled:** The population should be defined in clear and unambiguous terms. For example in sampling of farms clear cut rules must be framed to define a farm regarding shape, size, productivity, etc. keeping in mind the borderline cases so as to enable the investigator to decide in the field without much hesitation whether or not to include a given farm in the population. However, practical difficulties in handling certain segments of the population may point to their elimination from the scope of the survey. Consequently, for reasons of practicality or convenience the population to be sampled (sampled population) is in fact more restricted than the population for which results are wanted (target population).
3. **Defining the Sampling Frame and Sampling Unit:** The population must be capable of division into what are called sampling units for the purpose of sample selection. The sampling units must cover the entire population and they must be distinct, unambiguous and non overlapping in the sense that every element of the population belongs to one and only one sampling unit. For example, in a socio-economic survey for selection of people in a town, the sampling unit might be an individual person, a family, a household or a block in a locality. In order to cover the population decided upon there should be some list, map or other acceptable material called the sampling frame, which serves as a guide to the population to be covered. The construction of the frame is often one of the most major practical problems since it is the frame, which determines the structure of sampling survey
4. **Data to be collected:** The data should be collected keeping in mind the objectives of the survey. The tendency should not be to collect too many data, some of which are never utilized. A practical method is to chalk out an outline of the tables that the survey should produce. This helps in identifying the information that needs to be focused on.
5. **Designing the questionnaire:** Having decided about the type of the data to be collected, the next important part of the sample survey is the construction of the questionnaire — which requires special skills and techniques. The questionnaire should be clear, brief, corroborative, non offending, courteous, unambiguous and to the point so that not much scope of guessing is left for the respondent. Each and every question should be accompanied by suitable and detailed instructions for filling up the question.

Quite often, the data cannot be collected for all the sampled units. For example the selected respondent may not be available at his place when the investigator goes there or he may refuse to give certain information. This incompleteness called non-response tends to affect the results. Such cases of non-response should be handled with care in order to draw unbiased and valid conclusions. Procedures need to be devised in order to deal with non-response.

6. **Selection of Proper Sampling Design:** The size of the sample ( $n$ ) the procedures of selection and the estimation of the population parameters along with their margin of uncertainty are some of the most important statistical problems that should receive the most careful attention. A number of design plans for selection of a sample are available and a judicious selection will guarantee good and reliable estimates. For each sampling plan rough estimates of sample size  $n$  can be obtained for a desired degree of precision. The relative cost and time involved should also be considered before making the final selection of the sampling plan.
7. **Conducting the Fieldwork:** The last and final stage in the sample survey is conducting the field-work. Care should be taken before, while and after conducting a fieldwork. Pre-testing of the questionnaire (Pilot) is helpful in catching errors, streamlining the questionnaire design and planning out time and cost logistics. During the field-work continuous scrutiny and analysis of the filled in questionnaire help identify various mistake made by the investigators - which can be corrected. After the fieldwork is over the learning needs to be incorporated for future.

## 7.8 Errors in Sample Surveys

The objective underlying any research project is to provide information that is accurate and error free as possible. Maximizing accuracy requires that "total error" be minimized. Total error has two distinct components (a) Sampling Error and (b) Non Sampling Error.

**Sampling Error** refers to the variable error resulting from chance selection of elements from population as per the sampling plan. Since it introduces random variability into the precision with which sample statistics are calculated it is also called random sampling error.

**Non Sampling Error** consists of all other error associated with the research project and the sample survey. Such errors are diverse in nature and are often referred to as *bias*.

To get the maximum accuracy, a researcher should strive to minimize both the types of errors. Considering the time and cost limitations this can rarely be done. The researcher must make a decision that involves a trade off between sampling and non sampling errors. Unfortunately very little is known about the relative size of the two error components. It is generally believed that non-sampling errors tend to be larger of the two components. Sampling errors can, to a large extent, be reduced and / or controlled by following probability sampling procedures, but such a check is generally not possible on non-sampling errors

### Types of Sampling Errors

1. **Population Specification Error:** It is defined as the "*mismatch between the*

*required population and the population selected by the investigator*". It occurs when a researcher selects an inappropriate population from which to obtain data. For example, many a times packaged goods manufacturers conduct surveys amongst housewives – because they are easy to contact and because it is assumed that as they are the end users they make the purchase decisions. This assumption may not be always valid since husbands and children may significantly influence the buying decisions.

2. **Sampling Error:** It can be looked upon as the "*mismatch between the sample selected by probability means and the representative sample selected by the researcher*". It occurs when a probability sampling method is used to select a sample and this sample is not a representative of the population concerned. For example, if the definition of the intended sample is "adult between 21 and 65 years of age"; probabilistic sampling procedures may give a sample which consist only of individuals in the range 25 to 45. In such a case, a sampling error is said to have occurred.
3. **Selection Error:** It can be defined as the "*the mismatch between the sample desired by the researcher and the sample actually selected during fieldwork*". There is a natural tendency for the investigator to select those respondents who are easily accessible and agreeable. Such samples are mostly comprised of friends and relatives or known people who belong to the defined population strata. Selection error leads to problems in inferencing about the population.
4. **Frame Error:** The sampling frame can be looked upon as the list of individuals who form the population. A perfect sampling frame identifies each member of the population once and only once. However, in reality, it is difficult to come across a perfect sampling frame. Sampling frame either tend to over identify or under identify the population. For example, a sampling frame of oral-care users may well leave out people who use *neem* or *babool* sticks or homemade oral-care pastes — leading to underidentification of the population. On the other hand a telephone directory tends to over identify a population as members can have more than one telephone on their premise.
5. **Non Response Error:** Non response error occurs when the response from the original sample could not be obtained due to various reasons. Non response can occur in two ways — (a) Non Contact i.e. the inability to make contact with the all the members of the desired sample and (b) Refusal i.e. when the selected sample member refuses to answer all or part of questions put to her.

*Non Contact Error* occurs due to inability to reach the respondent. This may be because, the respondent is not at home (NAH), or has moved away from the area either temporarily or permanently during the period of the survey.

Non Contact errors can be reduced by carefully analyzing the population before starting the sample selection process.

*Refusal* occurs when the respondent does not respond to a particular item (or a multiple of items) on the questionnaire. Monthly Household Income, Questions about Religion, Sex, Politics etc. are some of the items that generally lead to refusal. These are normally categorized as “*refused*” in the data collection process. A second type of refusal is termed as “*Don’t Know / Can’t Say*” (DK/CS) refusal. This type of refusal occurs when the respondent is not fully aware regarding the facts to provide a cogent answer. Refusal rates can be brought down by continuously monitoring the fieldwork process and by giving training to the investigators.

6. **Surrogate Information Error:** This is defined as the “*mismatch between the information sought and the information obtained by the respondent*”. Or in other words, information is obtained from substitutes rather than original sample. The necessity to accept surrogate information arises from either the inability or the unwillingness of the respondent to provide the needed information. Decisional oriented behavioral research is always concentrated with prediction of behavior usually non-verbal. This limits most marketing research projects to use proxy information – data from past behavior. Attitudes, beliefs and SEC classification are all examples of surrogate information because based on these information we try to predict the future behavior of the respondents. Secondary sources of data are another source of surrogate information. Surrogate information error can be minimized by ensuring that the information used is highly correlated with the actual information obtained.
  
7. **Measurement Error:** This may be defined as the non correspondence of information obtained by measurement process and the information sought by the researcher. It is generated by the measurement process itself and represents the difference between information generated and information wanted by the researcher. Such errors can potentially arise at any stage of the measurement process — from the development of the instrument till the analysis of findings. The error can also occur at transmittal stage — when the interviewer is questioning the respondent. Faulty wording of question, non-preparation of non-verbal clues, behavior of the interviewer etc. may all contribute to how the respondent interprets the question. In the response phase — when the respondent is replying, error may occur because the respondent gave a wrong answer or the correct answer was wrongly interpreted and recorded. In the analysis phase, errors of incorrect editing, coding and / or descriptive summarization and inferences can lead to error.

## 7.9 Conclusion

For any research project, recognising that potential error exists is one thing - but doing something about it quite another matter. There are two basic approaches for reducing errors. The first is to minimise errors through undertaking correct sampling procedures. In this process effective use of sampling methods and techniques are utilised to lessen the impact of both sampling and non-sampling errors. However, cost constraints, and at times the peculiar nature of error, prevent complete minimisation of error through this method.

The second is to estimate and measure error. In spite of all the precautions undertaken, not all errors — especially those related to fieldwork — would be eliminated. In such a situation if we can have an estimate of error we can say how accurate the research design was. However only sampling errors are measurable with some degree of confidence. Either way, estimating is not an easy task due to the peculiar nature of the errors. Statistics help us to reduce the sampling error to a large degree but for non sampling error researchers still have to rely on their intuition.

**Example 1** Suppose that a certain hotel management is interested in determining the percentage of the hotel guests who stay for more than 3 days. The reservation manager wants to be 95% percent confident that the percentages have been estimated to be within 3% of the true value. What would be the most conservative sample needed for this study?

The population in this problem is assumed to be infinite. We have been given  $e = 3\% = 0.03$  and  $z = 1.96$  at 95% confidence level. As we want the most conservative sample size we shall assume  $p = 0.5$  and  $q = 1 - p = 0.5$ . Applying the formula for determining the sample size in the infinite population we have:

$$\begin{aligned} N &= \frac{(1.96)^2(0.5)(1-0.5)}{(0.03)^2} \\ &= 1067.11 \text{ or } 1068(\text{approximately}) \end{aligned}$$

**Example 2** Determine the sample for estimating the true weight of the cereal containers for the universe with  $N = 5000$  on the basis of the following information provided below: (a) The variance of the weight = 4 ounces on the basis of past records (b) Estimates should be within 0.8 ounces of the true average weight with 99% probability. Will there be any change in the size of the sample if we assume an infinite sample. If so, by how much?

In the given problem we have been provided the following information:  $N = 5000$ ,  $\sigma_p = 2$  ounce,  $e = 0.8$  ounce and  $z = 2.57$

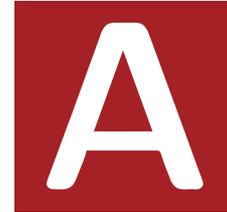
Applying the formula for estimating sample size in the finite population (eqn 7.3) we get:

$$\begin{aligned} N &= \frac{(2.57)^2(2)^2 5000}{(5000-1)(0.8)^2 + (2.57)^2(2)^2} \\ &= 40.95 \text{ or } 41(\text{approximately}) \end{aligned}$$

Taking the population as infinite and applying the formula (eqn 7.2), we get:

$$\begin{aligned} N &= \frac{(2.57)^2(2)^2}{(0.8)^2} \\ &= 41.28 \text{ or } 42(\text{approximately}) \end{aligned}$$

Thus in this given case the sample size remains unaltered. The reason for this is that the population size is large ( $N = 5000$ ) which effectively means that we are dealing with an infinite population.



## CASES FOR DISCUSSION

### A.1 ITC E-choupal

This marketing research case is about the impact of e-choupal's of the Indian Tobacco Company (ITC) on decision making ability of farmers related to agricultural practices. ITC started the e-choupal initiative in the year 2000 from Bhopal as a step to remove the intermediaries and connect the farmers directly to the mandi to make operations more transparent. ITC started with just 6 choupals and as on May 2007 reached more than 4 million farmers in about 40,000 villages through more than 6,500 choupals in Uttar Pradesh, Madhya Pradesh, Rajasthan, Maharashtra, Karnataka Andhra Pradesh and Kerala<sup>1</sup>.

ITC has plans to cover 1,00,000 villages in the next decade by creating a low cost IT based interactive transaction and fulfillment channel. The e-choupal provides various tangible and intangible benefits to the farmers. The tangibles include agricultural inputs suggested fertilizers and pesticides are the intangible benefits include information regarding whether advanced farming techniques and other techniques to boost the per hectare productivity.

#### Research Question

The primary objective of this case is to empirically validate the impact of ITC e-choupal initiative on improvement farmers decision making process in agricultural practices.

#### Hypothesis

The following hypothesis are proposed to validate the impact of ITC's e-choupal initiative

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<sup>1</sup>This case is adapted from *Zikmund, W. G., Babin, B. J., Carr, J. C., Adhikari, A., & Griffin, M. (2016). Business Research Methods - A South Asian Perspective (4th Indian Reprint ed.). Patparganj India: Cengage Learning India Pvt Ltd. pp. 84-85*

- Get timely price related information regarding market price of produce before selling it
- Determine what crop to grow and when to plant and harvest
- Make more profitable crop choices
- Use good quality seeds fertilizers and pesticides and more modern farm equipments
- Seek out more Expert Opinion frequently regarding improving modern agricultural practices
- Safe storing of Agricultural Products can be done more effectively
- Assess weather forecast timely
- Apply effective farming methods specific to each crop and region

### **Data collection, Questionnaire design, Sampling process**

The study population consists of the set of all form is who could get involved with ITC through purchasing agricultural inputs, selling harvests, accessing information from ITC's e-choupal. The sampling frame consists of 28 villages from Madhya Pradesh and Uttar Pradesh. For getting a diversified sample, the listing of farmers who are associated with the ITC e-choupal from different sanchalaks, the owners, and managers of internet kiosks, were stratified a per land sizes and year of association. In this way, 280 farmers were contacted for questionnaire survey. The data has been collected by resorting to questionnaire survey method. In addition to the demographic information of the respondents, 18 single item questions were used to get the responses. The questionnaires were personally administered to farmers and the responses were recorded. The response rate was found to be 89% as 248 filled in questionnaires were received back from the respondents. After elimination of questionnaires, where an excessive amount of data was missing, 244 responses were used for analysis.

### **Data analysis, Interpretation, Hypothesis support**

Paired sample T-test were conducted in order to determine if statistical difference existed between mean scores on the status of agriculture practices before and after Association with ITC. It was found that there was statistically significant improvement in decision making ability of farmers on all 18 aspects of decision making. Farmers decision making capability increase greatly due to availability of timely price related information regarding market price of products before selling (mean score 1.87 vs. 4.18;  $p < 0.001$ ) whereas there is very little improvement on what crop to grow (mean score 4.32 vs. 4.51;  $p < 0.001$ ), when to plant and what to harvest.

Table A.1: Mean Scores pre and post association with ITC E-Choulpal

<b>Agricultural Practices</b>	<b>Prior Mean</b>	<b>Current Mean</b>
Timely Price Related information available before sales	1.87	4.18
Determining What Crop to Grow?	4.32	4.51
Profitable Crop Choice	4.14	4.47
Good Quality Seeds, Fertilizers, and Pesticides	3.42	4.52
Use more modern Farming implements	2.64	3.77
Availability of Expert Opinion	1.91	3.07
Safe Storage of agricultural produce	3.32	4.15
Weather Forecast	2.48	3.61
Farming Methods suited to crop and region	3.19	4.00

## **Results and Limitations**

This marketing research case examines the impact of ITC enable system for information and service deliveries makes on their end user. The result clearly indicates that there is a marked improvement in the decision quality of the associated farmers on all aspects of value chain, right from agricultural input selection to post harvest management to final marketing of the produce. By providing solutions to specific questions of the farmers regarding plant diseases and expert opinion on other problems related to agriculture, ITC helps them to recognize the root cause of the problem. Once the root cause is identified, ITC help the farmers by providing information about the alternative courses of action, and thus, an informed customer is in a better position to evaluate the alternative and make purchase decisions. The results also indicates that the e-choupals help farmers throughout the production phase of the farming process.

This research has limitations too. The fixed sampling frame and limited sample used for the study, though representative of the population, limits the scope of generalization of the results of the study. There are several other ITC enabled e-governance systems which share the common objectives of empowering farmers to make the right decision related to farming practices. The study would have provided more meaningful inside if users of other ITC enable systems are compared with the uses of ITC e choulpal.

## **Questions for Discussion**

1. Describe the research process done on ITC e-choupals and identify the various stages?
2. How do you formulate hypothesis for this research project?
3. Comment on the data collection techniques adopted in the research program?

4. Can this research help farmers decision making on agricultural process?

## A.2 E-ZPass

In the 1990's, a task force was formed among the executives of seven regional transportation agencies in the New York - New Jersey area. The mission of the task force was to investigate the feasibility and desirability of adopting electronic toll collection (ETC) for the inter-regional roadways of the area. Electronic toll collection is accomplished by providing commuters with a small transceivers (tags) that emit a tuned radio signal. Receivers placed at toll booth are able to receive the radio signals and identify the commuter associated with the particular signal. Commuters establish ETC accounts that are debited for each use of the toll road or facility, thus eliminating the need for commuters to pay by cash or token. Because the radio signals can be read from a car in motion, ETC can reduce traffic jams at toll plaza's by allowing tag holders to pass through at moderate speed<sup>2</sup>

At the time the New York and New Jersey agencies were studying the service, ETC was already being successfully implemented in Texas and Louisiana. Even though several of the agencies had individually considered establishing ETC, they recognized that independent adoption would fall far short of the potential benefits achievable with an integrated inter-regional system.

The task force was most interested in identifying the ideal configuration of service attributes of each agency's commuters and determining how similar or different these configurations might be across agencies. The task force identified a lengthy list of attributes that was finally culled to the following six questions

- How many accounts are necessary and what statements will be received?
- How and where does one pay for E-ZPass?
- What lanes are available for use and how are they controlled?
- Is the tag transferable to other vehicles?
- What is the price of the tag and possible service charges?
- What are the other possible uses of E-ZPass tag?

From a researcher's perspective it also seemed important to assess commuters demand for the service. However, the task force was not convinced that it needs a projection of demand; because it was committed to implementing ETC regardless of initial consumer acceptance. The task force considered its primary role to be investigating consumer preferences for how the service should be configured *ideally*.

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<sup>2</sup>This case is adapted from Zikmund, W. G., Babin, B. J., Carr, J. C., Adhikari, A., & Griffin, M. (2016). *Business Research Methods - A South Asian Perspective (4th Indian Reprint ed.)*. Patparganj India: Cengage Learning India Pvt Ltd. pp. 140

## Questions for Discussion

1. Evaluate the problem definition process. Has the problem been defined adequately so that a relevant decision statement can be written?
2. What type of research design would you recommend for the project?
3. What all research questions would you like to test?
4. What would you put in the Research Proposal?

## A.3 Twilight Luxury: Retirement Solutions

Nikhil Taneja belong to the third generation of Taneja & Sons Builders. The company was started by Nikhil's grandfather in 1947. Nikhil Taneja, the heir apparent for the company, had been called by his grandfather and given his first independent strategic business unit (SBU) project. The plan was to set up "*Twilight luxury: Retirement Solutions for those who reinvent life*". The idea been to setup retirement solutions or housings for the senior citizens with resources and who could reasonably manage an independent Lifestyle. Nikhil had done extensive research in terms of collecting market and consumer data on senior citizens in India. He had developed some concepts and studied the purchase intentions for each of these solutions. Finally he had narrowed down to one concept which is described below<sup>3</sup>.

The concept, with Nikhil developed, was to have luxury condominiums on the Delhi-Agra expressway. These would range from one bedroom Studio Apartments to three bedroom fully furnished apartments. The price range would be Rs. 75 lakhs to Rs. 1.25 crores depending on the type of housing. The housings would be constructed as per the environmental guidelines. The area would have only 100 apartments. Facilities in the housing complex would include a library; a state of art movie theater, fully functional kitchen; 24 hour transport, nursing care and tie up with Apollo Hospital in Delhi for medical emergencies. Nikhil's Business Development team was looking at developing the marketing strategy for the housing solution. But before finalizing the marketing strategy, Nikhil decided to conduct market research to understand the consumer better. The research would be conducted at two levels – inhouse and amongst prospective buyers.

### Level 1 Research

The level 1 research would be conducted in-house at the company level. It was proposed to conduct in-depth interviews – with a written discussion guide – with the Board of Directors, The Head of Corporate Communications, The Executive

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<sup>3</sup>This case is adapted from: Chawla, D., & Sondhi, N. (2016). *Research Methodology - Concepts and Cases (2nd ed.)*. Noida, India: Vikas Publications, pp. 158–159

Director (Marketing) and a random sample of 10 employees who have been working with the company for minimum 5 years or more. The objectives which were discussed were as follows:

- Identify the typical consumer of Twilight luxury retirement solutions
- Define effective and focussed targeting principles for the segment
- Develop the clear and distinctive position stands for the housing brand

To facilitate the discussions a depth interview guide was developed as follows:

Table A.2: Level 1: Internal Discussion Guide

1.	What kind of buyers do you think will look at buying the condominiums that would be made under the project?
2.	Describes a prospective buyer in complete graphical detail?
3.	Describe the demographic characteristics of the buyers in terms of age, income, education, professional etc?
4.	How could this customer be similar or different to the kind of buyers who are currently buying Taneja Housing properties?
5.	Who do you think will influence the prospective buyer? A broker? A property agent? A friend?
6.	What kind of facilities would the buyer be looking for?
7.	How would the prospective buyer hear about the luxury project?
8.	What should be pricing of the recurring cost which the buyer will have to face while living in these apartments?
9.	Describe your visual image of Twilight luxury retirement solutions and suggest a tagline

### **Level 2 Research**

For the Level 2 research, another set of objectives were and the research was targeted to be carried out among the prospective buyers of the apartments. It was estimated that about 40 depth interviews would be conducted and each interview would take about 60–90 minutes of the respondent's time. The sample would be selected on the basis of convenience sampling method and would be restricted to people earning more than 50 lakhs per annum. The objectives were as follows:

- Identify a viable Concept for the Twilight luxury retirement solutions.
- Develop a clear and distinct brand positioning based on the concept note for the housing brand.

In order to facilitate the level 2 discussions another set of depth interview guides were prepared. These are given in table A.3.

Table A.3: Level 2: consumer discussion guide

	Thank you for agreeing to talk to me today. My name is ... I am conducting this study for for a respected infrastructure company who is thinking of expanding into retirement housing solutions. Please remember, that there are no right or wrong answers. It is a perception about the concept that we wish to capture. Your ideas and insights are what we are looking for to make the concept better.
1.	You see in front of you the gate of the Housing Complex. On the gate it is written "Twilight Luxury: Retirement Solution for those who reinvent life". Please tell me what will you see once you enter the gates? (PROBE for landscape, houses, any others)
2.	If you knock on the door of an apartment house who will open the door? (PROBE: describe the person, describe the interiors, anything else)
3.	If you further explore the surroundings of this Complex what else will you find?
4.	What will you see in this Complex which is different from what you have seen in other complexes?
5.	If you want to describe this place to someone you know how will you describe it

### Questions for Discussion

1. Evaluate the two depth interview guys in terms of completeness?
2. What are the possible errors in using these guides? How can these errors be reduced?
3. Can we use any other qualitative research technique for the study? If yes which one? if not why not?

## A.4 The Royal Bee Electric Fishing Reel

Royal Barton started thinking about an electric fishing reel when his father had a stroke and lost the use of an arm. To see that happens to his dad, who have taught him the joys of fishing and hunting, made Barton realize how much a physical handicap could take out of a sports enthusiast life. Being able to cast and retrieve a lure and experience the thrills of a big fish trying to take your rig away from you, were among the joys of life that would be denied to Barton's father forever<sup>4</sup>.

Barton was determined to do something about it, if not for his father, then at least for others who had suffered a similar fate. So, after tremendous personal ex-

<sup>4</sup>This case is adapted from *Zikmund, W. G., Babin, B. J., Carr, J. C., Adhikari, A., & Griffin, M. (2016). Business Research Methods - A South Asian Perspective (4th Indian Reprint ed.). Patparganj India: Cengage Learning India Pvt Ltd. pp. 254–255*

pense and years of research and development, Barton perfected what is sure to be the standard bearer for all future for freshwater electric reels. He had developed something that is small, compact, and has incredible applications. Called the "*Royal Bee*" – the first word is obviously Barton's first name and the second one refers to the low buzzing sound the reel makes when he use.

"*Royal Bee*" system look simple enough and probably is if you understand the mechanical working of a reel. A system of gear ties into the spool, and a motor in the back drives the gear attached to the triggering system. All gearing of the electrical system can be disengaged so that you can cast normally. But pushing the button for "retrieve" engages two gears. After the gears are engaged, the trigger travels far enough to touch the switch that triggers the drive belt and there is no slipping. You cannot hit the switch until the gears are properly engaged. This means that you cast manually, just as you would normally fish, and then reengage the reel for the level-wind to work. And you can all do this with one hand.

The system works on a 6-volt battery that you can attach to your belt or hang around your neck if you are wading. If you have a boat with a 6-volt battery, the reel can actually work off the battery. There is a small connector that plugs into the reel so you could easily use more than one reel with the battery. For instance, if you have two or three outfits equipped with the different lures, you can just switched the connector from reel to reel as you use it. A reel with "*Royal Bee*" system can be used in a conventional manner. You do not have to use it as an electric reel unless you choose to do so.

Barton believes that the "*Royal Bee*" may not be just for handicapped fisherman. Ken Cook, one of the leading professional anglers in the country, is sold on the *Royal Bee*. After he suffered a broken arm, he had to withdraw from some tournaments because fishing with one hand was difficult. By the time his arm healed, he was hooked on the *Royal Bee* because it increased fishing efficiency. As Cook explains "the electric reel has increased my efficiency in two ways. One is in flipping, where I use it all the time. The other is fishing top-water, when I have to make a long cast. When I am flipping the electric really gives me instant control over slack line. I can keep both hands on the rod. I never have to remove them to take up slack. I flip, engage the reel, and then all I have to do is to push the lever with my thumb to take up the slack instantly. In effect, the electric reel allows me to eliminate unproductive reeling time".

After few seconds may not mean much if you are out on a neighborhood pond, just fishing on the weekend. But it can mean a lot in a tournament competition, where one extra cast might keep you from going home with \$ 50,000 tucked in your pocket. When Royal Barton retired from his veterinary supply business, he seriously started thinking of marketing the "*Royal Bee*" system. He realized that he needed professional help in marketing the product, so he sought assistance to learn how to reach the broadest possible market for the *Royal Bee* system.

### Questions for Discussion

1. What Business Research Problem is Royal Barton facing? What are the information he needs? Outline some survey research objectives for a research project on the “*Royal Bee*” system?
2. What type of survey should be selected? What needs to be done to ensure a high response rate?
3. What are the possible sources of errors that are likely to occur? How can they be controlled

### A.5 RAP Food Stores

RAP Food stores is a chain of large food stores that operate as supermarkets. The management of the chain has decided to expand to a new market areas. At present, the company has stores located throughout the Western part of India. The area of expansion includes the Eastern states of West Bengal, Bihar and Odisha. One of the board members had suggested that the company take a look at the store designs. The Board Member believes that food habits in eastern India are extremely different from that of west India and as such the store design and layout that has been appropriate for the Western India may not be appropriate for the Eastern India. The marketing research group, at the corporate level, has been asked to look into this issue for the stores that are to be opened in the new market area<sup>5</sup>.

Ms. Alankrita Banerjee has been appointed as the project head. Ms. Banerjee has been with the RAP group for about two years, having join the RAP group upon receiving an MBA degree from IMI New Delhi. In thinking about the problem posed by the management, Ms. Banerjee came to the conclusion that some form of qualitative research would be the most appropriate. She also believe that whatever research was conducted should be done directly with potential customers in the targeted market area.

Remembering what she had learned in Business School, Ms. Banerjee is considering using Focus Group and / or some form of projective technique for the project. If focus groups is to be used, the question arises regarding who should conduct them, how many should be used and where should they be conducted? Ms. Banerjee has some experience with focus groups having audited a few for one of her instructors at IMI New Delhi. Selecting an appropriate projective technique would be difficult because of the many alternative available. For example, Ms. Banerjee believes that such techniques as the TAT, story completion, Third Person Technique and others might be appropriate. In addition, she remembers an unusual technique mentioned by the speaker in one of the marketing research courses. This speaker developed an approach developed in clinical psychology –

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<sup>5</sup>This case is adapted from *Green, P E., Tull, D. S., & Albaum, G. (1997). Research for Marketing Decisions (5th ed.). New Delhi: Prentice Hall of India Private Limited. pp. 358, 363*

the “*Draw the Supermarket Technique*”. Although the technique is mentioned in several marketing research text, it has seen only limited application.

*Draw the Supermarket Technique* involves having a sample of people draw a picture of the interior of a Supermarket on a blank piece of paper. These drawings are then analyzed with regard to the department omitted, the order in which the departments are drawn, and space allocated to each department. In addition to the sketches, Ms. Banerjee thought it would be helpful to get additional information from the members of the sample. The sample members would be asked to indicate (a) Supermarket where most of the family groceries were purchased (b) the supermarket department considered most important and (c) the supermarket department considered least important.

Strategic Planning Department of the group objected to the use of qualitative research technique proposed by Ms. Banerjee. They want to conduct face-to-face interview in six major towns of West Bengal Odisha and Bihar using a well-defined sampling methodology. They argue that qualitative research would only give them ideas and will not provide them with concrete numbers to do projection. The management – in a process of reconciliation – has decided to go ahead with both the techniques.

#### **Questions for Discussion**

1. Which technique would you prefer and why?
2. For your preferred research technique develop a suitable sampling plan
3. Define the target population, sampling unit and sample size for the preferred technique