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## LECTURE # 01

### Introduction to Marketing Research

Marketing starts with marketing research and ends at marketing research. Before we start our discussion about marketing research, let us see what marketing is.

#### Marketing

Marketing includes all activities necessary for the conception, pricing, promotion and distribution of goods, services and ideas to create exchanges that satisfy individual and organizational objectives (needs).

Why are some companies more successful than others? It is mainly because these companies correctly “**hear**” the consumers wants and needs and produce a product service, price, distribute and promote it so that it satisfies those needs and wants. Marketing concept is the core of marketing and marketing managers must practice this concept by developing marketing strategies using information from the customers. If you want to describe marketing in one sentence it is “**customer satisfaction**”

The marketing concept is a way of thinking that holds the organization can best achieve its goals (profit etc.) by determining the needs and wants of target market (customers) and delivering the desired satisfactions more effectively and efficiently than competitors do. The bottom line of marketing is that the focus of entire firm is on satisfying consumer needs and wants. But how does a company know what customer’s needs and wants are? Obviously marketer must have appropriate information about customer’s needs and wants if they are to truly apply the marketing concept. However, having the right concept is one part of the battle; but developing and implementing marketing strategies that actually satisfy the consumer’s needs and wants is another. Let us see what marketing strategy is.

#### Marketing Strategy

A marketing strategy consists of selecting a marketing segment as a company’s target market and designing a proper marketing mix i.e. four Ps of the marketing program i.e. product/ service, price, promotion and distribution system to satisfy the needs and wants of the target market.

Marketing managers needs some pertinent information to develop a good marketing strategy. The needed information may include:

- What is the market?
- How do we segment the market?
- What are needs and wants of each segment?
- How do we measure the size of each segment?
- Who are our competitors?
- What is the marketing strategy of our competitors?
- Which segment/s should we select for targeting?
- Which size, model and quality of product should we produce that best suits our target market?
- What is the best price?
- Which method shall we use to distribute our product/ service?
- What kind of advertisement, publicity should we use? etc

These questions among others must be answered. As such, marketing managers need objective, accurate and up-to-date information to develop workable marketing strategies. Environments also influence the marketing strategy. Environments include social, cultural, political, economic and technological conditions prevailing and marketing programs prepared by the managers. As environments are constantly changing, marketer's need for up-to-date information is never ending. Collection, analysis and use of such marketing information in decision making by marketing managers is within the scope of marketing research.

### **Marketing Research - Definition**

The American Marketing Association (AMA) has defined marketing research as the:

“Function that links the customer, customer and public to the marketer through information-information used to identify and define marketing opportunities and problems; generate, refine and evaluate marketing actions; monitor marketing performance; and improve understanding of marketing as a process”. This definition is a bit longer but spells out the basis function as well as uses of marketing research.

For the purpose of this course, we adopt a short definition of marketing research:

“Marketing Research is a systematic and objective process of designing, gathering, analyzing and reporting information that may be used to solve specific marketing problems and assisting the management to improve their decision relating to marketing”. This definition is short and focuses on the steps involved in the process of marketing research and its assistance in decision making in the area of marketing management.

### **Role of Marketing Research**

The major role of marketing research is to provide information that facilitates marketing decisions. In the absence of relevant information, the marketing manager may be making decisions on the basis of his experience or guesswork. For example, when launching a new product, if the demand of that product is not known, the company may be undertaking a risk; and in case of failure of the product, the investment and marketing efforts etc may sink. But if before launching, feasibility made on the basis of scientific research, the product may capture the market and will be a success. Marketing Research provides substantial support in strategy development by providing the marketing managers an in depth understanding of situation and then assisting them in choosing appropriate strategy alternatives.

### **Situation Analysis**

Understanding the markets and the customers-who they are, how they behave, why and what do they buy and how they are likely to respond in future-is the heart of marketing research. Understanding of marketing environment and the specific characteristics of market are equally essential while developing a marketing strategy. Marketing research helps in acquiring an in depth understanding of both environment and the markets.

The following list indicates some representative's information that the marketing research provides on the situation assessment of major consumer goods. Such information is effectively used in strategy formulation.

#### **A. Market Environment**

1. Economic trends
2. Social trends
3. Technology trends
4. Legal requirements on quality, labeling and safety

**B. Market Characteristics**

1. Market size, potential, growth
2. Location and spread of customers
3. Different segments and groups of customers
4. Competition: number, size and performance of competitors. Competitive products
5. Channel of distribution: wholesale and retail coverage.

**C. Consumer Behavior**

1. Who buy our product? Demographic and psychographic characteristics
2. Brand preference
3. Where do they buy? Outlet types
4. Motivation. Why do they buy?
5. Influence of different groups: peers, family
6. When do they buy? Frequency of buying
7. How do they evaluate the product?
8. Influence of advertising

**Marketing Mix**

The major aim of marketing strategy is to determine the marketing mix. Marketing research helps in evaluating different alternatives and ultimately including these in the marketing plan. Thus marketing research provides an information base for the marketing manager to decide about the marketing mix i.e. product, price, distribution and promotion.

Marketing research answers the following questions in this regard:

**A. Product**

1. What product attributes are important for customer?
2. How should the product be differentiated from competitor?
3. How should the packing be designed?
4. How important is warranty, after sale service etc?

**B. Price**

1. What is the elasticity of demand?
2. How should the product be priced?
3. What is the paying capacity of the market?
4. How do we react to competitive price change?
5. How important is price to the buyer?

**C. Place**

1. What kinds of outlets should handle our product: wholesale's, distributors, dealer, agents, retailers etc
2. How many intermediaries should be there?
3. What rate of commission/ discount is appropriate?
4. How can channel of distribution be motivated to push our product?
5. How physical distribution of products be managed?

**D. Promotion**

1. What is the optimum promotion mix? How much of advertising, public relations, personal selling and sales promotion?
2. What should be the promotional budget?
3. What media are most effective for our product?
4. How do we measure the effectiveness of advertising etc?

5. Which advertising agency should be hired to handle our promotion campaign?

**Marketing Research Industry**

In the early days, business owners knew their customers, so there was little need for formal marketing research. Gradually business grew, customers were separated from business managers and marketing research was needed to understand the customers of distant markets. Now business management has realized that, in order to survive effectively, marketing research is genuinely needed to practice the marketing concepts.

In response to the needs of marketing research by the business and industry, companies have created their Research and Development (R&D) departments. Also many research companies called Research Suppliers have come into being.

**Research Suppliers**

There are scores of organizations, nationally and internationally which are providing research services to business and industry on payment. Some research companies (research suppliers) perform all functions of research. Such companies are called full service research supplier. Others perform one or more tasks of marketing research. These are called limited service research suppliers. For example, some companies do only data collection or data analysis for the clients.

## ***LECTURE # 02***

### **Selection of Marketing Research Supplier**

These are the factors which are considered by the clients for the selection of a marketing research company to give them a marketing research project

- Reputation
- Number of projects completed
- Completion on schedule
- Quality of projects completed
- Has the firm done similar projects?
- Personnel –Technical-non technical expertise
- Client service: communicate well
- Cost-competitive bids
- Remember cheaper bid is not always the best
- Cost & quality be compared

### **Careers in Marketing Research**

- Vice President Marketing Research
- Research Director
- Assistant Director Research
- Senior Project Manager
- Statistician/ Data Processing Specialist
- Senior Analyst
- Junior Analyst
- Fieldwork Director
- Operational Supervisor
- Fieldworker

### **Ethics in Research**

- Ethics towards Client
- Ethics towards Profession
- Ethics towards Respondent

### **Successful Marketing Research**

Successful marketing research is decision oriented. Marketing research should be undertaken when it is likely to reduce uncertainty of decisions. There is no use of doing marketing research if it does not provide any input in a marketing decision. Marketing research is considered successful if it is relevant, timely, efficient and accurate.

#### **A. Relevant**

Marketing research should be undertaken for solving some marketing problem. It should support some strategic or tactical marketing planning activities. In new circumstances, new research should be considered for decision. Marketing research should not be undertaken only to satisfy curiosity.

#### **B. Timely**

Marketing decisions are usually fixed in time and must be taken according to a schedule and relevant information should be made available before time. If a product is to be launched in November, research on its formulation, name, advertising, price etc should be conducted in time

i.e. before November so that it can be successfully launched in November. There is no sense to conduct research after November. Timeliness of marketing research is necessary.

### **C. Efficient**

As stated already each research is undertaken to reduce some risk in some decision. If it is unfortunately wrong, it will cost the company some money which will be in the form of investment with regard to the decision e.g. development of a new product, selection of a new market, signing new channel of distribution etc. At the same time, each research has incurred some cost that you spent on field work, data analysis, stationery, report writing etc. A research is efficient if the cost of the research is less than its benefits. If the cost outweighs the benefits, then there is no use of research. It is unwise that you should spend three million rupees on research to reduce a risk which is worth only two million rupees.

### **D. Accurate**

No research is better than the accuracy of its data. Timeliness, relevance or efficiency should not be compromised on accuracy of results. Methods and procedures of research should be such that they reduce the biases and help ensure the accuracy of data and analysis.

### **Ethics in Research**

There are many ethical behaviors that the researcher should display while conducting research; but there are three specific ethical responsibilities on the part of the researcher which can be classified as ethics towards clients, towards respondents and towards profession.

#### **Ethics towards Client**

Ethics towards client demand that the research supplier should not share the results of the research with any other firms, particularly the competitors of the client. As the client has funded this research, so the client has the sole right to take benefit of the results of the research. As such, the findings of the research should not be shared with anyone else.

#### **Ethics towards Respondents**

Ethics towards respondents demand that the data provided by the respondents (subjects) of the research should be kept confidential and should not be reported with the name of the respondents. Right of anonymity of the respondents should be safeguarded.

#### **Ethics towards Profession**

Ethics towards profession require that the researcher should be true professional. The researcher should follow the code of conduct of the research profession. The researcher is morally obligated to provide unbiased research design, honest and objective fieldwork and appropriate and meticulous analysis regardless whether the clients know about these standards or not and whatever the client's expectations are. The researcher should also perform all research activities completely as agreed upon with the client. For example, if it was agreed upon that 1300 questionnaires will be distributed to collect data, the questionnaires should not be less than 1300, otherwise it will amount to cheating and dishonesty.

### **Research Process**

Research process can be viewed as series of steps observed in research. These steps are combined in some researches. However following are ten steps in the process of research:

1. establish the need for marketing research
2. define research problem
3. establish research objectives
4. formulate research design

5. determine types and sources of data
6. determine sample size and select sample
7. design, data collection instruments
8. collect data
9. analyze data
10. prepare and present research results

Let us understand that generally the steps are followed in the above sequence, but it may not be followed in the exact order as given above. The researcher may move back and forth as he/she discovers new things in the process of research.

Let us discuss these steps in brief.

### **1. Establishing the Need for Marketing Research**

The research is always undertaken when there is need for information to solve a specific marketing problem, that is, when a marketing manager needs some information to facilitate a marketing decision. There is a management dilemma, a problem or an opportunity which needs to be assessed before establishing objectives for that opportunity. For example decline in share of market is a problem; opening a fast food restaurant where there is already no one within a radius of three kilometers is an opportunity. Marketing research could be conducted in both the situations as there is genuine need for information to make necessary decisions.

A good monitoring system can establish the need for marketing research. Such a monitoring system brings operating information to management. A good monitoring system will alert the marketing manager about the problems that can be tackled with the help of marketing research. This system will inform the marketing managers about the changes that are occurring in the environment, the performance of the sales force, and competitive moves. If the information is readily available, there is no need to do marketing research. Due to use of information technology, much of right information is readily available through databases or websites to the decision maker. Likewise when there is not enough time for marketing research due to competitive pressure or some other reason, this does not justify undertaking marketing research. Similarly if sufficient funds are not available, research cannot be undertaken or when cost of doing marketing research outweighs the benefits, it is quite unwise to do marketing research.

Marketing research should be considered only on justifiable grounds; when there is a genuine need. Marketing research should be avoided if:

- a) information needed is already available
- b) when time is enemy (time is short to meet the deadline)
- c) when funding is not available
- d) when cost of doing research outweighs the benefits which will accrue from the research

### **Define the Problem**

Defining the marketing research problem is the single most important step of the marketing research process. It is very true to say “a problem well defined is half solved”. This is easy to say than to do. Client may not exactly know the problem of research; this is the researcher who has to define it. Research should address the real problem otherwise the money spent on it will go waste. The manager should discuss the situation he/she is facing with the researcher. Both of them can have long and detailed discussion so the problem is clearly identified, understood and defined. The researcher should translate the management problem into research problem. Symptoms and problems should be differentiated. Symptoms are like tips of the iceberg whereas problem may be deep down like iceberg itself. Definition of problem may involve only discussion with the decision

maker but some times it involves interviews with other managers, employees, industry experts, analysis of secondary data and occasionally focus groups.

### **Establish Research Objectives**

Research objectives are information needed to solve the marketing problem. Research objectives are related to and determined by the problem definition. Research objectives may be in the form of research questions. They may also take the form of research hypotheses. Here is an example of each:

**Research Objective:** determine the average level of satisfaction for our service.

**Research Question:** is our service of average, below average or above average for our customers.

**Research Hypothesis:** our customers are satisfied with our service.

### **Determining Research Design**

What is research design? A research design is a framework or blueprint to conduct a research project. It is like an architect's plan to build a house. It provides detailed procedures for obtaining and analyzing the required information. It details out what is the nature and sources of data, the instrument of data collection, how to test hypothesis, if any, scaling procedures, sampling process and plan of data analysis.

There are three basis research designs, exploratory descriptive and causal/ experimental.

**Exploratory design** suits those research projects where very little is known. New opportunities can be evaluated. It may help define and refine the research problem or generate research questions/ hypotheses.

**Descriptive research design** is used when research phenomena is to be described. It describes marketing variables. It answers what, who, why, how, when and where question. These types of studies describe such things like consumer attitudes, intentions and behaviors, number of competitors, their strategies and demographic or psychographic characteristics of the consumers. Descriptive studies are quite common in marketing research and are frequently undertaken internally or externally. They are the mainstay of the marketing research as they generally allow the marketing managers to draw inferences about their target markets, customers, competitors and other areas of concern.

**Causal research design**, although used on limited scale in marketing research, allows the market researchers to isolate causes and effects. What is the effect of various marketing variables say price, package, sales promotion methods, on other variables like sales. In other words, causal designs allow us to determine causality or which variable is causing another variable to change. The variable which causes the change is called independent variable and the one is called dependent variable. If the advertisement increases the sales, the former variable is independent and the latter is dependent.

Causal design involves experiments which are laid down to measure the change in independent and dependent variables. These are other variables which effect relationship between independent and dependent variables, that is, either they affect independent variable or the dependent variable. Such variables are intervening or moderating variables and should be controlled by the researcher which is rather difficult.

The researcher has to determine which design is most appropriate for his/her research at hand. The design that will meet the objectives of the research and will bring maximum efficiency and accuracy of data should be selected by the researcher.

### **Determine Types and Sources of Data**

Basically these are two types of information available to researcher in marketing research secondary data and primary data. Secondary data as the name implies, is that information which

has already been collected for some other purpose and now it is being used for a secondary purpose. It is second hand information. Books, internet, CD ROMs, Databases etc. are big sources of secondary data for marketing research.

Secondary data are quickly collected and are relatively inexpensive. It has a data fit problem and sometimes lacks integrity and authenticity. On the other hand, primary data are not readily available. Primary data are collected specially for the study at hand for the first time by the researcher's team for this project. It is collected by questionnaires, interview, observation, electronically or telephonically. In marketing research, both types of data are collected but use primary data is perhaps more than secondary data.

### **Determine Sample Size and Select Simple**

Market researchers make use of samples while doing research. Samples are selected from the population. Population is the aggregate of all the units which have the data for the research. Sample is a portion or subset of the population which the researcher selects to work with. The researcher collects data from the samples and draw conclusions about the characteristics of population. Therefore the sample should be representative. In sampling process, the researcher has to specify.

- a) Sampling frame
- b) Size of the sample; and
- c) Method of selecting that sample

Sampling frame is an up-to-date list of all population elements from where the sample is to be selected size of the sample is to be decided by the researcher on the basis of various factors including precision, confidence, time, budget requirement of the client etc. methods of selecting samples are many primarily these methods are probability and non probability. Sampling issues are discussed in details later in this book. For different research projects, size of the sample and methods of sampling are different.

### **Designing Data Collection Instruments**

Information is collected in marketing research; therefore, the actual design of data collection instruments or tools is critical to the success of the project. Even if the problem has been correctly identified and defined and a good research design has been selected, asking the wrong questions will destroy the usefulness of the research efforts.

Primary data are collected basically by two methods: by asking questions or by observing. Questions are asked through questionnaires which are either mailed or administered personally or by face to face interview. The questionnaires may also be transmitted electronically (e-mail). Development and pre-testing of questionnaires requires good communication and writing skills. Questionnaires are structured and unstructured. Structured questionnaires which are also called close ended have list of questions that have pre specified answer choices. Unstructured questions which are also called open ended question allow the respondents to answer in the way he/she likes.

## *LECTURE # 03*

### **Collect Data**

The process of data collection is critical since it involves a large proportion of the research budget and a large proportion of total error in the research result. Data collection requires a field force of some type. This field staff operates in the field for personal interviewing (in-home, mall intercept or computer assisted personal interview) or telephonic interview or mailed questionnaire or electronic mail (e-mail or internet). Proper selection, training, supervision and evaluation of the field force are necessary to minimize errors in data collection.

### **Data Analysis**

After the data have been collected by the field force, the data are to be analyzed. It has two steps- **data preparation or processing** and **data analysis**.

**Data preparation** includes editing, coding, transcription and verification. Each questionnaire or form is inspected or edited and if necessary, corrected. Numbers or codes are assigned to represent each response to each question in the data collection instrument e.g. male = 1, female =2 etc. The data from the questionnaire is input directly into computer. In the second stage, **data are analyzed** by the way of tabulation, cross-tabulation and statistical tests. Tabulation refers to counting of number of responses or observations that fall in each category of responses. It allows the researcher to understand what collected data means. Examining two or more response categories at the same time is called cross tabulation. Finally a variety of statistical tests including means, frequencies, correlations, trend analysis, test of significance etc are also used to analyze data. Data analysis leads to draw conclusions and answer the specific research questions.

### **Prepare and Present the Research Report**

Last step (Report) is most important phase of marketing research.

**Importance** Research report properly communicates the study results to client. Entire project documented in a research report, details are here:

Tables, graphs to enhance clarity and impact,  
Neatly produced analysis according to objectives,  
SPSS or other in variably oral presentation before finalization,  
Major findings, conclusions,  
Improvement, additional work, report finalized,  
Research report should be clear, concise, complete  
Standard format, parts-TOG language,  
Level of audience,

### **Types of Marketing Research**

There are two types of marketing research.

**Basic research** knowledge valuable, laser all scientists.

**Applied research** undertaken to solve a specific research problem mostly applied.

Other types are action, co relational etc.

### **Defining Problem**

Problem definition is critical. It gives direction to subsequent phases of marketing research.

Standardized research (syndicated) same process day in and day out (e.g. retail audit). It is done by marketing research supplier. Research may be customized where a unique marketing management problem is confronting the manager.

Researcher should understand the unique situation for customized problem. Conduct discussion with manager. Problem definition is in the form of statement of the general problem and identification of the specific components of marketing research problem.

### **Difference between Managers and Researchers**

Both work in different worlds.

**Manager**-line, decision making, make profit, want answer to questions, emotional, political, want the symptoms disappear, Practical-pragmatic.

**Researcher**-staff, generate info, want to ask questions, scholarly, detached, unemotional, non-political, want to find the truth.

As marketing managers and marketing researchers have different orientations, they develop differences. Both should understand each other role. Discussions support each other. Both should view marketing research as partnership endeavor.

They can have meaningful discussions to classify the things. For example whether to investigate changes in the market place or select alternative marketing action or help gain some competitive advantage or stay abreast of market trends. Marketing research problem differs from marketing management problem.

### **Management Problem**

It is a decision making situation confronting the marketing manager emerging from problems (low performance of the product) opportunities (new trends) or symptoms (market share declining).

### **Research Problem**

Marketing research is defined as providing relevant, accurate, unbiased information that managers can use to solve their marketing management problem. Research problem is defined on the basis of management problem, it is critical that management problem be defined accurately and fully.

### **Example of Relationship between Decision and Research Problem**

| <b>Decision problems</b>                                      | <b>Research problems</b>                                                            |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Develop packaging for a new product                           | Evaluate effectiveness of alternative packaging designs                             |
| Increase market penetration through the opening of new stores | Evaluate prospective locations                                                      |
| Increase store traffic                                        | Measure current image of the store                                                  |
| Allocate advertising budget geographically                    | Determine current level of market penetration in respective areas                   |
| Introduce new product                                         | Design test market and do market testing to check the acceptance of the new product |

### **Constructs and Operational Definitions**

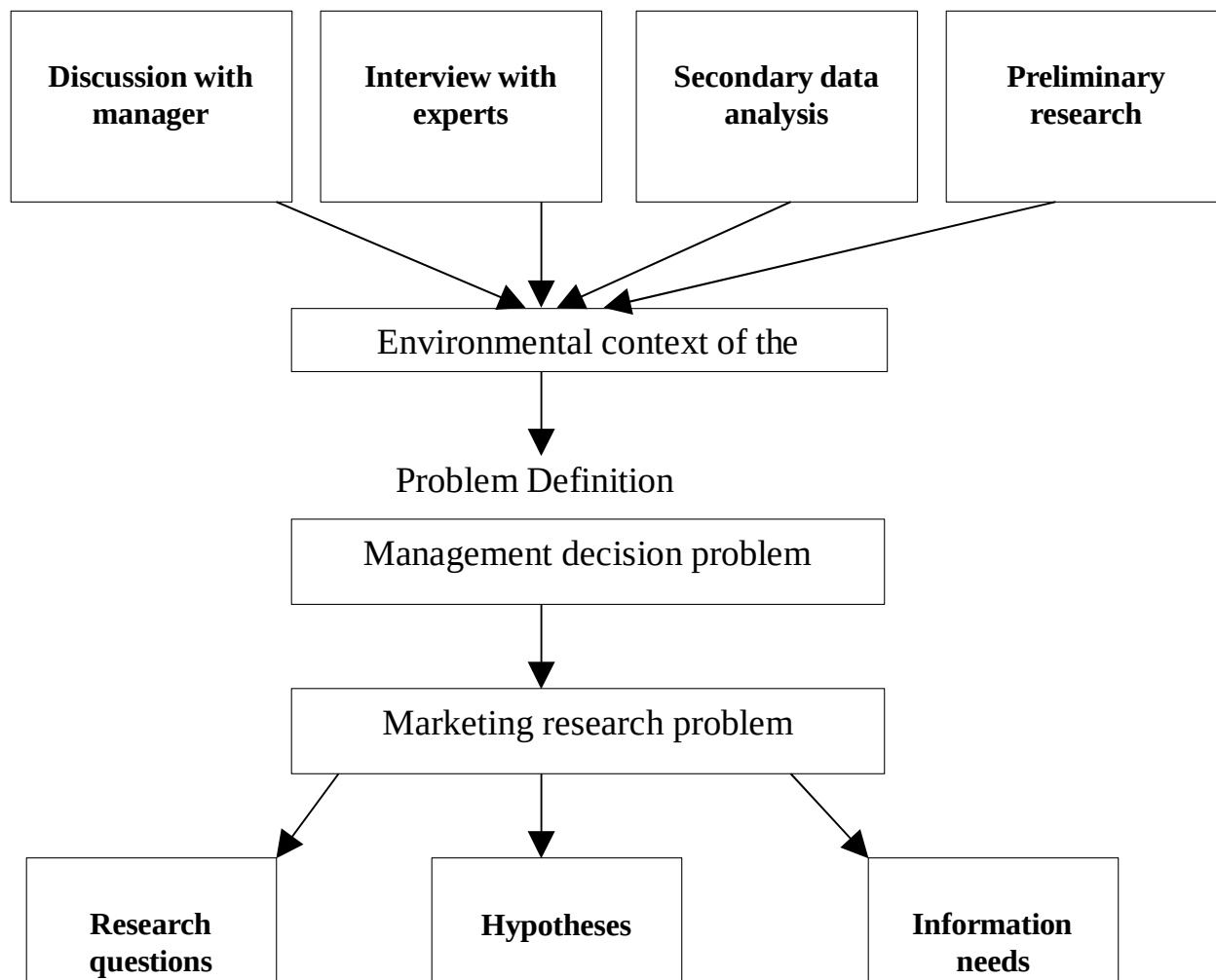
To formulate the research problems, the market researcher has to specify constructs and operational definitions and identify relationship between various constructs.

A construct is a term for concept that is somewhat involved in the marketing management problem that will be researched. Examples of marketing constructs may be brand awareness, recall, attitude towards brand, lifestyle, and brand loyalty etc. Although general perception of these constructs may be shared by the managers and researcher, yet market researcher translates the construct into an operational definition which describes how a construct will be measured. It ultimately helps in formulating the questions that will be asked to get information about the construct. Examples follow.

| Construct              | Operational definition                                      |
|------------------------|-------------------------------------------------------------|
| Brand awareness        | Percentage of respondents having heard of the brand         |
| Recall of ad           | Number of people who remember seeing an ad                  |
| Knowledge of product   | What they can tell about the product                        |
| Attitude towards brand | Number feel positive or negative about the brand            |
| Satisfaction           | How they evaluate its performance                           |
| Brand loyalty          | How many times they bought the brand in the last six months |

### Process of Defining the Research Problem

The task involved in the definition of problems are explained below:



## LECTURE # 04

### Examples of Marketing Management and Marketing Research Problems

#### Example I Marketing Management Problem

Alpha company has a long history of successful marketing of business planning products such as calendars, appointment books, diaries etc for business people. In the last few years their sales has shown decline despite booming economy and business expansion. Management believes this fall in sales can be attributed to the competitive strategy particularly xyz group. It may also be due to electronic scheduling books or softwares that are available now. Thus Alpha must determine the causes of decline and suggest suitable marketing actions to counter the decline.

#### Marketing Research Problem

Research should be conducted to identify what competitor's actions have adversely affected Alpha's sales. It should also be determined if customers of the traditional day planners are switching over to electronic day planners and software scheduling systems.

#### Specific Research Objectives

1. Trace market share of the competitors of the traditional day planners over the past five years.
2. Determine changes of the competitors marketing strategy (i.e. 4Ps) for the same period.
3. Evaluate the customer's potential for the adoption of electronic scheduling books and integrated software schedulers programs.

#### Example II Marketing Research Problem

Determine the weaknesses and strengths of Departmental Store A visa-vis other major departmental stores with respect to factors that influence the store patronage.

#### Research Questions

1. What criteria do households use when selecting departmental stores?
2. How do household evaluate Departmental Store A in terms of these criteria?
3. Which stores are chosen for shopping the specific product categories?
4. What is the market share of Departmental Store A for specific product categories?
5. What is the demographic and psychographic profile of customer of Departmental Store A. does it differ from competing stores?

#### Secondary Data in Marketing Research

As already defined secondary data are those data which have already been collected by someone else (and not the researcher) for some other purpose in the past. Now these data are being gathered by the researcher second hand.

**Primary data** is originated by the researcher for the first time for the project at hand. It is time taking and expensive is a short comparison of secondary and primary data.

#### Comparison of Secondary and Primary Data

|                | Secondary      | primary      |
|----------------|----------------|--------------|
| <b>Purpose</b> | other project  | this project |
| <b>Process</b> | quick and easy | time taking  |
| <b>Cost</b>    | relatively low | high         |
| <b>Time</b>    | short          | long         |

**Advantages and disadvantages of secondary data**

| Advantages             | Disadvantages         |
|------------------------|-----------------------|
| Easily accessible      | Data fit problem      |
| Relatively inexpensive | May be outdated       |
| Rapidly obtained       | Relevance is doubtful |
|                        | May not be accurate   |

**Sources of Secondary Data**

Secondary data may be internal or external. Internal data are generated within the organization for which the research is being conducted. These data may be ready to use or may require further processing before it is used in the research. Some of the typical internal data include:

- a. Sales data (by product, period, territory)
- b. Cost data
- c. Accounting data
- d. Shipping data
- e. Budgets
- f. Sales calls data
- g. Record of advertising and promotion
- h. Manufacturing reports
- i. Quality check report
- j. Sales return reports
- k. Customer complaint reports
- l. R & D reports.

**External Sources of Secondary Data**

In addition to internal sources, secondary data can be obtained from external sources which are generated outside the organization. Such data exist usually in published and online form. Federal, provincial, local governments publish such data regularly. In addition, Chambers of Commerce, trade and professional associations, marketing research firms and commercial publishers also publish such data for sale. Let us see what are different kinds of external secondary data available in published and electronic form?

**Published Sources**

Such data are available from the libraries or such entities as trade associations, chambers of commerce or supplier syndicate of research firms. General business data are in the form of books, journals, periodicals, reports and magazines. Directories and guides regarding business and commerce are available in the libraries. Government sources include documents like census data, Economic Survey of Pakistan and Statistical Reports.

**Databases**

A database is a collection of data and information describing of items and interest. Theoretically we can have a non-computerized database but practically almost all databases are computerized because of computer's ability to sort, edit and analyze the information.

Companies collect information about their customers and prepare internal databases for their marketing purposes. On the other hand, there are lots of external data bases supplied by outside organizations. These are available either free or on a nominal fee.

**Computerized Databases**

• A computerized database is a collection of data record in a computer readable form. These databases are accessed online on a telecommunication network. Internet databases can also be accessed and downloaded for storing the data elsewhere. Databases are offline too. Such databases are available on CD-ROM disks. Online or offline, databases can be classified as bibliographic, numeric, full-text, directory and special purpose databases.

**Computerized Databases**

- Online and offline databases can further be classified as:
- Bibliographic databases: such databases contain citations to journal articles, newspapers, government documents, technical reports and marketing researches etc.
- Numeric databases: These databases contain numerical and statistical data. Industrial data are in the form numeric database.
- Full-text databases: Such databases offer the complete text of articles appearing in the selected publications including newspapers, journals etc.
- Directory databases: These databases list information about individuals, organizations, government entities and service providers.
- Special-Purpose databases: Such databases provide information of special nature, for example data on a specialized industry.

**Syndicated Sources of Data**

Another important source of external source of secondary data is the syndicated service. As already explained, syndicated services are the marketing research companies that collect and provide information from a common pool of data to different clients who subscribe to their services. Obviously such information needs are shared by many companies who are served by the syndicates on payment. Subscription of each client is nominal as compared to if the data were collected exclusively for this particular client. Syndicated firms collect the same standardized data. Such data are not collected for a particular client but drawing from a common pool, the data are fit to the individual needs of the client. Syndicated services collect and provide data on households and consumers, psychographics, lifestyles, advertising evaluations, scanner services, retail audits, wholesale audits, buying power index etc. Companies use syndicated service data in segmentation, distribution and media planning.

## **LECTURE # 05**

### **Research Design**

Research design is a plan or blueprint for conducting the marketing research project. It specifies the details of the methods and procedures necessary for collecting and analyzing data for the project. It is a set of advance decisions that make up the master plan for collection and analysis of the data.

To develop a research design is important as it saves the time and money of the researcher. When we make advance thinking and make necessary decisions as to how to collect information and analyze it, this result into efficiency and economy. Research design serves the researcher as a blueprint serves a builder. It is just like an architectural plan.

### **Classification of Research Design**

Research design may be broadly classified into exploratory or conclusive.

#### **Exploratory Research Design**

The primary objective of exploratory research design is to provide insight and comprehension of the problem situation that confronts the researcher. In this design we obtain background information, define terms to clarify the problems and hypotheses and establish research objectives. It is unstructured and informal research. It is unstructured in the sense that it does not have a formalized set of objectives, sample plan or questionnaire. It is usually conducted at the outset of a research project and aims to know much about the problem. It needs additional information or desires new or more recent information about the problem. It may generate possible hypotheses to test.

#### **Conclusive Research Design**

Exploratory research is generally followed by the conclusive research. Conclusive research is typically more formal than exploratory research. It is based on large representative samples and data gathered are quantitatively analyzed. Here are the differences between exploratory and conclusive research.

#### **Differences between Exploratory and Conclusive Research**

|                        | <b>Exploratory</b>                                                                                                                  | <b>Conclusive</b>                                                                                |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Objective</b>       | To bring insight and understanding                                                                                                  | To generate test and specific hypothesis                                                         |
| <b>Characteristics</b> | Analysis of primary data are qualitative<br>Flexible, unstructured and informal process<br>Information obtained are loosely defined | Analysis of data is quantitative<br>Formal and structured process<br>Information clearly defined |
|                        | Sample small and non representative                                                                                                 | Representative and large sample                                                                  |
| <b>Conclusions</b>     | Tentative                                                                                                                           | Final-conclusion                                                                                 |
| <b>Outcome</b>         | Followed by conclusive or further exploratory research                                                                              | Findings used as input in decision making                                                        |

### **Purposes of Exploratory Research**

The purposes of exploratory research may be put to use in a number of situations which are as follow:

#### **1. Gain Background Information**

When the researcher does not have enough understanding of the situation and very little is known about the problem, exploratory research may be undertaken. Much needed background information

is collected through exploratory research. For example in a marketing problem, insight can be gained in brands, sales territories of the firm and so on.

## **2. Precision and Clarity in the Problem**

Exploratory research is helpful in defining the research more clearly.

## **3. Develop Hypotheses**

Hypotheses are tentative statements which are to be tested yet. They describe speculative relationships between two or more variables. In exploratory research we find out the variables before we hypothesize the relationship.

## **4. Establish Research Priorities**

Exploratory research helps in determining the priorities of topics to research. For example on the basis of customer complaints, the products may be identified which need more attention of the management.

## **5. Define Terms**

Exploratory research will clarify the concepts and as such can help in defining terms, for example, 'store image' 'customer satisfaction' etc. It also reveals how to measure these concepts.

## **Methods of conducting exploratory research**

A variety of methods can be used to conduct exploratory research. These include review of literature and other secondary data, focus group, depth interview, experience survey and projective techniques. Let us examine these methods in detail.

### **1. Secondary Data Analysis**

Search and analysis of secondary data is often the core of exploratory research. As we know, secondary data is in the form of published and electronic material, so the researcher should consult libraries and browse internet. The researcher may also use online and offline data bases for his/her research.

### **2. Focus Group**

It is an increasingly popular method of gathering data for exploratory research. Focus group is an interview conducted by a trained moderator through spontaneous, unstructured discussions with a small group of respondents. Although the focus group techniques encourage openness, yet it is "focused". We will discuss focus group method in detail later in this section.

### **3. Expert or Experience Survey**

It refers to gathering information from the expert and knowledgeable persons with regard to the topic of research. It is an unstructured personal interview aiming to know the problems and difficulties relating to the research problem, forecasting demand etc. Experts or experienced people in this survey may be chosen on the basis of judgment and convenience of the research. They don't have to be a representative sample.

### **4. Depth Interview**

Depth interview is an interview with a single person i.e. one to one. It is conducted by a highly skilled interviewer and it uncovers the attitudes, benefits, motivation and feelings of the respondents about the topic. There is free exchange of information between the researcher and the respondent, unlike focus group, where the effort is made to keep the discussion focused.

It is more expensive than focus group because such an interview is conducted with singular person instead of a group. It may be employed in special problem situations, such as:

- a. Probing of the respondents
- b. Understanding of complicated behavior
- c. Product consumption expense
- d. Information about sensitive, embarrassing or confidential topic (personal finance, loose dentures)

- e. Interview with professional people
- f. Interview with competitors in exceptional circumstances

### 5. Projective Techniques

Borrowed from the field of clinical psychology, projective techniques are indirect focus of questioning that seeks to explore the hidden motives for buying goods and services. These techniques encourage the respondents to project themselves and share his underlying beliefs, attitudes or feeling about the issue of research. In projective techniques, respondents are asked to interpret the behavior of others rather than describe their own behavior. In doing so, respondents indirectly project their own needs, motives, attitudes and values. Respondents are given ambiguous situations to interpret and by interpreting the situation, they project themselves. Projective techniques are classified as word association, sentence completion, construction and expressive techniques. Let us see what these techniques are.

#### a) Word Association

In this technique, a respondent is presented a list of words. He/she is asked the first word that comes to his/her mind analyze brand names. This is used to parking which store name, economy (store), strength (cement) taste (tea, juice), location (Chinese restaurant), and fresh (bakery)

#### b) Sentence Completion

Incomplete sentence are given and respondents are asked to complete:

A person who shops at Pace is \_\_\_\_\_

Someone who drinks packaged juice is \_\_\_\_\_

Pearl continental hotel is most liked by \_\_\_\_\_

When I think of shopping in a store, I think of \_\_\_\_\_

Tea is good to drink when \_\_\_\_\_

Story completion is a variation of sentence completion. Part of the story is given to the respondent and he completes the rest of it. In doing so he/she projects his perceptions about the environments and other things.

#### c) Construction Technique

In this technique, the respondent is required to construct a response in the form of a dialogue, description or story. In picture response, the respondent is given a picture and asked to describe it. It has its roots in Thematic Apperception Test (TAT) where series of pictures were given to the respondents and they were asked to construct a story. Sometimes cartoon characters are shown in a specific situation related to the problem and the respondents are asked as to what a character is saying in response to the other's comment. It is also called balloon test. See for example.

#### Expressive Techniques

In expressive techniques, the respondent is presented with some visual or verbal situation and asked to relate the feelings and attitudes of other people in the situation. Role playing and third-person techniques are usually used in this category. In role playing, the respondents are asked to play the role and assume the behavior of someone else. As such they project their own feelings in this role. In third person technique, the question about a third person like friend, neighbor etc is asked and when the respondent is describing the behavior of that person, he/she is projecting himself/herself.

#### Focus Group Interview

As we know a focus group interview is a discussion led by a trained person called moderator. The focus group brings insight by talking to the representative of the target market. It also brings unexpected findings which emanate from free flowing ideas of the group. This is one way that the marketer gets in touch with the target market.

#### Objectives of Focus Group

Among others, there are four main objectives of focus group interview.

These are:

- To generate ideas. New product, service, use of the product or improvement
- To understand consumer vocabulary and stay up-to-date about the words and phrases the consumer use about the product and its use. It helps in problem definition.
- To reveal consumer needs, attitudes, perceptions and motives on the product and its use. This will subsequently help to create objectives for the research.
- To understand findings from quantitative studies. Focus group becomes an instrument for the researcher to comprehend and interpret the findings of the survey.

### Operational Characteristics of the Focus Group

|                       |                                                              |
|-----------------------|--------------------------------------------------------------|
| Size of focus group   | 8-12                                                         |
| Composition of group  | pre-screened-homogeneous provide incentive for participation |
| Moderator             | trained, having good interpersonal and observational skills  |
| Duration              | 1-3hours                                                     |
| Physical arrangements | informal /relaxed                                            |
| Location              | focus group facility, hotel                                  |
| Recording             | Audio-video                                                  |

### Qualification of a Good Focus Group Moderator

|                                      |                                                                                         |
|--------------------------------------|-----------------------------------------------------------------------------------------|
| 1. A friendly leader                 | Viewed not dictatorial/ threatening, like to talk, elicit honest response firm but kind |
| 2. knowledgeable but not all knowing | Has some knowledge but not expert. He needs to know. Not to be questioned.              |
| 3. Quick Learner                     | Absorb client briefing. Understands and leads the group discussion                      |
| 4. Good listener                     | excellent memory                                                                        |
| 5. A facilitator not performer       | Promote discussion not dominate<br>Not extra humor                                      |
| 6. Encouraging                       | To unresponsive members                                                                 |
| 7. Flexible                          | Change the questions after planning, if needed                                          |
| 8. Permissive                        | Permissive yet alert and focused                                                        |
| 9. Involved                          | Personally involved in discussion, stimulating                                          |
| 10. Sensitive                        | To guide at intellectual and emotional level                                            |

### Conducting a Focus Group

Determine the objectives of the research



Project and define the problem



What are objectives of focus group?



Develop screening questions

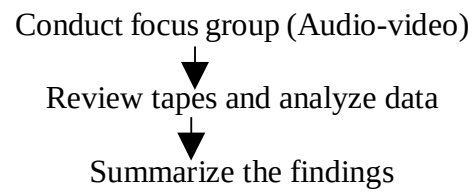


Recruit the focus group members



Develop moderator's outline





## *LECTURE # 06*

### Online Focus Group

Apart from traditional focus group, it can be conducted online. Size of the focus group is usually four to six and it can be conducted anywhere in the world. It continues for about an hour or so. Group dynamics are limited. It is inexpensive as compared to traditional focus group but the data gathered through conventional focus group are more valuable than online focus group.

### Advantages of Focus Group

Several advantages:

- |                              |       |                                             |
|------------------------------|-------|---------------------------------------------|
| 1. Synergism                 | _____ | several people put together to produce info |
| 2. Snowballing               | _____ | a person's comment triggers chain reaction  |
| 3. Security                  | _____ | Group security. Feels free to express       |
| 4. Spontaneity               | _____ | spontaneous, not planned accurate           |
| 5. Speed                     | _____ | many people ideas                           |
| 6. Client observes the group | _____ | one way glass group                         |
| 7. Flexibility               | _____ | change with the situation                   |

### Disadvantages of Focus Group

- |                               |       |                                                 |
|-------------------------------|-------|-------------------------------------------------|
| 1. Misjudgment                | _____ | subjective interpretation, so trained moderator |
| 2. Cost                       | _____ | per participant is high                         |
| 3. Sample                     | _____ | not representative                              |
| 4. Moderation                 | _____ | difficult                                       |
| 5. Domination of some members | _____ | control of the moderator is needed              |

### Application of Focus Group in Marketing Research

Focus group can be used in almost any situation requiring some preliminary understanding and insight. Focus group can be used in marketing research to address issues like:

1. developing copy for advertisement
2. obtaining an impression about price of the product
3. new product concept testing
4. understanding consumer perceptions, preference and purchase behavior
5. finding new ideas about old products
6. generating hypotheses for research

### Do's and Don't about Focus Group

1. Be sure to get the right people in the group
2. Avoid judging participants on physical appearance
3. With focus group few is better than many
4. Never do focus group without planning
5. Never lose sight of the objectives of the research for which focus group is being conducted
6. Hire a trained and qualified moderator
7. Compute the report and submit it quickly.

### Descriptive Research Design

Major purpose of descriptive research is to describe the marketing functions or characteristics. It provides answers to questions such as who, what, how, when, where as they are related to the research problem. Descriptive research is typically conducted to answer the following basic questions to formulate effective marketing strategies.

1. Describe the characteristics of relevant groups such as consumers, market areas, sales person etc.
2. Percentage of units in a population showing certain behavior. For example percentage of heavy users of a brand.
3. Product characteristics as perceived by the market/customers.
4. Degree of association of different marketing variables. For example association of income and buying quantity. Such association does not mean cause and effect relationship.
5. To make predication about the occurrence of marketing phenomena. For example what will be the sales of Bata stores in Okara during December 2007?

### **Classification of Descriptive Research**

Descriptive research can further be classified into two: cross-sectional and longitudinal. These are described below.

#### **Cross-Sectional Studies**

Cross-sectional studies measure the data from a sample at one point in time. Sample is like a cross-section of population. If you have to measure the population at different times, every time a new sample should be taken. Cross-sectional studies are quite prevalent in marketing research. As the data from the sample are collected only once, they are also called snapshot studies. Usually the cross-sectional studies use a large sample that is why these are called surveys research with which people are most familiar.

#### **Longitudinal Research**

Longitudinal research is a type of research design which involves a fixed sample measured repeatedly on the same variables. In cross-sectional design, sample changes every time but in longitudinal research sample remains the same over time. In cross-sectional study there is only one picture or snapshot but in longitudinal study there are series of pictures which provides a view of the changes that have taken place over time.

Term “panel” is used to describe a longitudinal design. A panel contains a sample of respondents who have agreed to provide information at specified intervals over an extended period of time. Panel may be group of customers, experts, household or stores. Panel members are compensated for their participation by gifts, coupons, or cash.

There are two types of panels:

1. Traditional panel
2. Omnibus panel

#### **Traditional Panel**

The traditional panel is a fixed sample where the some variables are measured repeatedly.

#### **Omnibus panel**

The omnibus is a fixed sample which is measured repeatedly, but the variables measured are different.

Traditional panel's studies can be used to analyze how members switched from one brand to the other from one time period to the next. Another use of longitudinal study is that of market tracking studies. Through such studies changes over time can be measured. A marketer can track how his/her brand is doing as compared to other brand by having representative data on brand market share.

### **Methods Used in Descriptive Design**

There are basically two method employed in descriptive research: survey and observation

**Survey method** is based on questioning of respondents. Questions may be asked verbally, in written form or through computer. Questions may be asked about awareness, interactions, attitude, motivation, demographics or lifestyle of the respondents.

Questions in survey may be structured or unstructured. Structured questions, which are usually asked in a survey research, are standardized and as such are direct. Unstructured question are open and do not have a prearranged answer choices.

### **Advantages of Surveys**

Comparatively a survey method allows collection of significant amount of data in an economical and efficient manner. Survey methods typically allow larger sample. There are at least four advantages of survey methods:

1. Standardization
2. Ease of administration
3. To find out unseen
4. Suitable for tabulation and statistical analysis

#### **1. Standardization**

Survey methods ensure that all respondents are asked the same questions. Same order of questions and same choices of answers are given to each respondent. The sequence of the questions is same. In nutshell we can say that it is a standard questionnaire which is being administered to all respondents.

#### **2. Ease of Administration**

Whether personal interview, telephonic interview, computer assisted interview or mailed questionnaire, survey methods are easy to administer. Mailed questionnaires are perhaps the simplest method. There are no tap recording, taking notes or analyzing projective or physiological data.

#### **Find Out “Unseen”**

Much of the unseen data can be found out through direct questions. For example we can find out by asking the respondents how many stores he visited before making the final purchase. Similarly we ask about income size of the family or occupation which was otherwise unobservable by the researcher. All unobservable information can be obtained through direct questioning.

#### **Suitable for Tabulation and Statistical Analysis**

Survey methods are designed in a way that tables can easily be prepared and statistical packages like SPSS can easily used. In contrast to qualitative research where samples are small, it proves much frustrating when subjected to statistical analysis. But long cross-sectional surveys perfectly suit these statistical procedures.

#### **Classification of Survey Method**

Survey methods can be classified on the basis of mode used to administer the questionnaire.

These are:

- Personal interview
- Telephonic interview
- Mailed questionnaire

#### **Personal Interview**

In personal interviews, respondents are interviewed face-to-face. The surveyor or interviewer reads the questions to the respondent and records the answers in writing, audiotape or videotape form. It has been a primary method of survey for many years but its use is declining due to advances in technology and rising cost. Nevertheless the personal interviews are still used due to their following advantages.

- a. **Feedback:** Non verbal cues give feedback to interviewer as whether the respondent is understanding the question or not. The clarification may be provided by the interviewer or question may be adjusted accordingly.

- b. **Rapport:** Due to personal presence of the interviewer, a rapport can be developed with the interviewee. Thus the respondent starts relating to the interviewers and answers the interviewers questions more openly. Respondents are more truthful when they are face-to-face.
- c. **Quality control:** For interviews most of the times researcher selects the respondents based on certain distinguishing characteristics that are relevant to research. Personal interviewers must ensure that respondents are selected correctly before the interview takes place. This helps maintain quality of the research.
- d. **Adaptability:** Personal interviewers can easily adapt to the needs of different respondents. He/she can help an elderly respondent understand how to respond to “some what agree” or “strongly agree”. Similarly he can give examples to the respondents on other issues. He can adjust the direction. If the interviewer does not understand the answer, he/ she can ask probing questions to get clarification of or depth in the answer.

**Personal interviews** have three main disadvantages. They are expensive, take more time and lend themselves to interviewer’s bias. The interviewer may ask some leading questions or can give hint to a specific answer which is not desirable in research.

### Categories of Personal Interview

Personal interviewing may be categorized into three types:

- a. In-home personal interviews
- b. Mall intercept personal interviews
- c. Computer-assisted personal interviews

**a. In-home personal interviews** take place in the home or office of the respondent according to the convenience of the interviewer. Interviewer fixes an appointment of date, time and place of the interview prior to going for interview.

**b. Mall intercept personal interview** In mall-intercept interview respondents are shoppers at the shopping malls and they are intercepted while shopping in the store or outside the store. Sometimes they are intercepted and brought to an office facility built by the research firms on the shopping mall for this purpose. Mall intercepts take place in high traffic shopping areas. Mall intercept has acquired a major role as a survey method due to its ease of implementation. It is less expensive than depth interview in home or in office. This has a very low cost per interviewee method. But representativeness of mall intercept sample is always an issue. In shopping malls interviews, some shoppers refuse to give interview. Another disadvantage of mall intercept is that the environment of shopping malls is not as comfortable as office or home. Therefore big questionnaires need to see meaningful information

**c. Telephonic interview:** Where physical contact of the respondent is not possible or is expensive, telephonic interviewing is attractive option. There are a number of advantages as well as disadvantages of telephonic interviewing.

**Advantages of telephonic interview** include speed and cost. Telephone is relatively inexpensive to collect data. Another advantage of telephone survey is that it is quick to collect data through telephoning, (A good interview per hour with the help of telephone).

Telephone interviews have some shortcomings too. First, you cannot demonstrate or show anything to the respondent on the phone. Therefore where this is important to show an advertisement, package etc. telephone interview is not a good alternative. Second disadvantage is that telephone interview does not permit observation of body language, facial expression or eye contact with the respondents and the interviewer is deprived of the benefit of observational judgment which otherwise is available in face-to-face interview. Third disadvantage of telephonic interview is that the information obtained through this method is more limited in quantity as the people do not like to answer many questions on the phone and hang up quickly. Telephonic

interview is a poor choice of conducting a survey with many open-ended questions. It also has a great potential for fake interviewees. An additional problem in countries like Pakistan is that most of the women respondents hesitate to be interviewed on the phone.

**Computer Assisted Interviewing**

Computer can assist the interviewers both in personal interview and telephone interview. Computer Assisted Personal Interview (CAPI) and Computer Assisted Telephone Interview (CATI) are being used in marketing research in advanced countries but these are in the development stage in developing countries.

Internet is also being used in marketing research. E-mail interviews survey are not uncommon now. E-mail addresses are obtained and questions are e-mailed on these addresses. Respondents type the answers to either close-ended questions at the designated places and click on “reply” to send them back.

**Mailed Questionnaire**

Another type of data collection is the mail interview which is usually through mailed questionnaires or mail panels. In a typical mailed interview, questionnaires are sent to the respondents by mail. The questionnaire is accompanied by a return envelope and a cover letter. Prior to that, respondents had been identified through appropriate sampling method and a mailing list developed. The cover letter appeals the respondent in an effective manner to return the questionnaire in the accompanied return envelope with postage stamps affixed by the researcher.

The mail surveys have some advantages and disadvantages. Advantages include very low cost per respondents and convenience of the respondents to fill out the questionnaire on their convenience. Main disadvantage of the mailed questionnaire is very low response rate.

People are more willing to participate in survey for a worthy reason or incentive.

**Mail Panel**

A variation of mailed interview is the mail panel. A mail panel consists of a large sample of household who have agreed to participate in mailed questionnaires and product tests or telephone surveys periodically. They either volunteer to do so or are provided some incentive. Data from panels is updated periodically. Panel is prescreened to ensure that panel members represent target market or consumer of interest.

**LECTURE # 07****Mailed Questionnaire**

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**Comparison of Survey Methods**

The above mentioned survey methods are evaluated on different factors in the following table.

**A Comparison of Different Survey Methods**

| <b>Factor</b>                          | <b>Personal interview</b> | <b>Mail intercept</b> | <b>Telephone interview</b> | <b>Mail survey</b> | <b>Mail panels</b> |
|----------------------------------------|---------------------------|-----------------------|----------------------------|--------------------|--------------------|
| Volume of data                         | more                      | more                  | Less                       | less               | less               |
| <b>Speed</b>                           | moderate                  | moderate/high         | High                       | low                | low                |
| <b>Response rate</b>                   | high                      | high                  | moderate                   | low                | moderate           |
| <b>Flexibility of data collection</b>  | high                      | high                  | moderate                   | low                | low                |
| <b>Accuracy of data</b>                | very good                 | very good             | Good                       | very good          | very good          |
| <b>Obtaining sensitive information</b> | low                       | low                   | High                       | high               | moderate/high      |
| <b>Possibility of interview bias</b>   | high                      | high                  | moderate                   | nil                | nil                |
| <b>Time consumed</b>                   | high                      | moderate              | moderate                   | moderate           | moderate           |
| <b>Expense</b>                         | high                      | moderate              | moderate                   | low                | low/moderate       |
| <b>Sample control</b>                  | high                      | moderate              | moderate                   | low                | moderate/high      |

**Observation Methods**

Another method of data collection in descriptive research is observation which records the behavior pattern of people, objects or events in a systematic manner. Observation is limited to provide information of the current behavior.

There is no question or communication of observer with the people being observed. Observation can be structured and unstructured, disguised and undisguised or natural vs. contrived.

**Structured vs. Unstructured**

In structured observation, the researchers determine in advance what behaviors are to be observed and recorded. The researcher prepares a checklist of these behaviors and ignores all others. Structured observation is useful on conclusive research. In unstructured observation, the researcher observes all the episodes under study and records whatever he/she finds interesting and relevant. No details of what will be observed are set in advance. Observer's bias in unstructured observation is potentially high and this type of observation is more suitable for exploratory research.

**Participant vs. Non Participant Observation**

Participant observation is a method in which the observer or researcher participates in the process being observed. For example he/she can be customer, a worker, or a trainee. In non participant observation the observer is just an observer.

**Undisguised and Disguised Observation**

When the subjects are informed that they are being observed for some purpose such an observation is known as undisguised observation.

When the subjects are unaware that they are being observed, this observation is called disguised observation. Sometimes the observer disguises the observation process by using one way mirrors or hidden cameras.

**Natural versus Contrived Observation**

Behavior can be observed in natural or artificial setting. If the observation takes place in natural environment, it is known as natural observation, for example, a researcher observing the behavior of respondents while eating at McDonald.

It is called contrived observation when the respondent is brought in an artificial setting and observed. Tests done by varying shelf space, product flavors and display locations fall under contrived observation.

**Other Methods of Observation**

The methods of observation based on mode of administration are classified as below.

**1. Human Observation**

In this method, observer is the researcher himself/ herself or a person hired for this purpose. The observer merely record what he/she observes.

**2. Mechanical Observation**

In this observation, a mechanical rather than the human eye observes the phenomenon. Such mechanical devices include people meter, audiometer, on-site-cameras, turnstiles (to count the people entering or leaving a building) and scanners etc. Scanners are good devices to collect information about the consumer purchases by product category, price, quality, brand and store type.

**3. Trace Analysis**

This is the observation of some traces of the event that has passed. Data collection is on the basis of physical evidence or traces of the past behavior. This is like observing the trash of subject being studies. It is also known as unobtrusive method. Notice the following examples

- a. Erosion of tile in a building
- b. The magazines that were donated to charity shows the popularity of magazines
- c. Wear and tear of pages in a journal shows its readership
- d. Age and condition of the car in the parking lot to determine the affluence of the customers
- e. Number of empties of Coke or Pepsi to determine the consumption of Coke or Pepsi

#### **4. Content Analysis**

It is the observation as well as analysis of various content of communication which is manifest. In marketing research context, applications of content analysis involve observation and analysis of message of advertisement, radio and television programs, newspaper article and the like. In international marketing content analysis has successfully been used in studying foreign cultures and cross-culture ads.

#### **5. Retail and Wholesale Audit**

In this method of observation, the researcher checks physical record or performs inventory analysis. We have discussed this method in detail in the section of syndicated services

#### **Advantages and Limitation of Observation**

Observation can be used to supplement and complement other research techniques to check on the result obtained by others.

Ideally the subject of observational research should not be aware that they are being observed. Because of this, the respondents would react in a natural manner. This provides the researcher insight into actual not reported behavior. The subjects of the research are not asked about something, they are observed. Thus there is no chance for recall error. Data obtained through observation is up-to-date and correct, if interpreted correctly.

In some cases, observation may be the only choice to obtain correct information. For example, children who cannot express their opinion about a new toy can be observed while playing or not playing with the new toy. Observation methods can successfully be employed to collect marketing intelligence in retail marketing and employee's behavior by way of "mystery shoppers" are actually trained observers but pose as customer in the competitor's store.

Observation has limitations too. Due to small sample and subjective interpretation, results are usually considered tentative. A big limitation of observation as a method of research is that beliefs and internal conditions of the subjects cannot be observed. Certainly with observation, you cannot tell what is going beneath the surface behavior. Observation methods are successful when such feelings are unimportant for the research.

Another problem with the observation is that sometimes it is time consuming and expensive. Also it has potential for observer's bias. It is therefore suggested that observation should not be used alone rather in combination with other survey methods. It is estimated that not more than only one percent marketing research project rely solely on observational methods as a means of obtaining primary data.

## ***LECTURE # 08***

### **Casual Research**

Causality when the occurrence of X increases the probability of the occurrence of Y.

### **Conditions for Causality**

Before making causal inferences, or assuming causality, three conditions must be satisfied. These are:

1. concomitant variation
2. time order of occurrence of variables
3. elimination of other possible causal factors

Concomitant variation is the extent to which causes X and an effect Y, occur together or vary together in the way predicted by the hypothesis under consideration.

### **Time Order of Occurrence of Variables**

The time of occurrence condition states that the causing event must occur either before or simultaneously with the effect; it cannot occur afterwards. By definition an effect can not be produced by an event that occurs after the effect has taken place.

### **Absence of Other Possible Causal Factor**

The absence of other possible causal factors means that the factor or variable being investigated should be the only possible causal explanation.

### **Definitions and Concepts**

We define basic concepts and illustrate those using examples.

### **Independent Variables**

Independent variables are variables or alternatives that are manipulated i.e. the levels of these variables are changed by the researcher and whose effects are measured and compared. These variables also known as treatments may include price levels, package design and advertising themes.

### **Test Units**

Test units are individuals, organizations or other entities whose response to the independent variables or treatments is being examined. Test units may include consumers, stores or geographic areas.

### **Dependent Variables**

Dependent variables are the variables that measure the effect of the independent variables on the test units. These variables may include sales, profits and market shares.

### **Extraneous variables**

Extraneous variables are all variables other than the independent variables that affect the response of the test units. These variables can confound the dependent variable measures in a way that weakens or invalidates the results of the experiment. Extraneous variables include store size, store location and competitive effort.

### **Experiment**

An experiment is formed when the researcher manipulates one or more independent variables and measures their effect on one or more dependent variables, while controlling for the effect of extraneous variables.

### **Experimental Design**

An experimental design is a set of procedures specifying:

1. the test unit and how these units are to be divided into homogenous subsamples
2. what independent variables or treatments are to be manipulated
3. what dependent variables are to be measured
4. how the extraneous variables are to be controlled

### Definition of Symbols

To facilitate our discussion of extraneous variables and specific experimental designs, define a set of symbols that are now commonly used in marketing research.

X= the exposure of a group to an independent variable, treatment or event the effects of which are to determined.

O= the process of observation or measurement of the dependent variable on the test units or group of units

R= the random assignment of test units or groups to separate treatment

In addition the following conventions are adopted

- Movement from left to right indicates movement through time
- Horizontal alignment of symbols implies that all those symbols refer to one specific group, treatment or control.
- Vertical alignment of symbols implies that all those symbols refer to activities or event that occur simultaneously

For example, the symbols arrangement

$$\begin{array}{ccc} X & O_1 & O_2 \end{array}$$

Means that a given group of test units was exposed to the treatment variable (X) and the response was measured at two different points in time,  $O_1$  and  $O_2$

### Validity in Experimentation

When conducting an experiment, a researcher has two goals,

1. Draw valid conclusions about the effects of independent variables on the study group
2. Make valid generalizations to a larger population of interest. Internal validity the second external validity the first goal concerns

### Internal Validity

Internal validity refers to whether the manipulation of the independent variables or treatments actually caused the observed effects on the dependent variables. Control of extraneous variables is a necessary condition for establishing internal validity.

### External Validity

External validity refers to whether the cause and effect relationships found in the experiment can be generalized. It is desirable to have an experimental design that has both internal and external validity but in applied marketing research often we have to trade one type of validity for another.

### Threats to Internal Validity

Following are threats to internal validity in the form of extraneous variables.

#### History

History refers to specific events that are external to the experiment but occur at the time as the experiment. These events may affect the dependent variable.

What if general economic conditions declined during the experiment and the local area was particularly hard hit by layoffs and plant closing. The longer the time interval between observations, the greater the possibility that history will confound an experiment of this type

#### Maturation

Maturation refers to change in the test units themselves, occur with the passage of time, involving people. Maturation takes place as people become older, more experienced, tried, bored or uninterested. Stores change over time in terms of physical layout, décor, traffic and composition.

**Testing Effects**

Testing effects are caused by the process of experimentation. The main testing effect (MT) occurs when a prior observation affects a latter observation.

**Instrumentation**

Instrumentation (I) refers to changes in the measuring instruments are modified during the course. Instrumentation effects are likely when interviewers make pre and post-treatment measurements. The effectiveness of interviewers can be different at different times.

**Statistical Regression**

Statistical regression (SR) effects occur when test units with extreme scores move closer to the average score during the course of the experiment. People with extreme attitude have more room for change, so variation is more likely.

**Selection Bias**

Selection bias (SB) refers to the improper assignment of test units to treatment conditions. If test units self-select their own groups or are assigned to groups on the basis of the researcher's judgment, selection bias is possible. For example, consider a merchandising experiment in which two different merchandising displays (old and new) are assigned to different department stores. The stores in the two groups may not be equivalent to begin with. They may vary with respect to a key characteristic, such as store size. Store size is likely to affect sales regardless of which merchandising display was assigned to a store.

**Mortality**

Mortality (MO) refers to the loss of test units while the experiment is in progress. This happens for many reasons, such as test units refusing to continue in the experiment. Mortality confounds results because it is difficult to determine if the lost test units would respond in the same manner to treatment as those that remain.

**Controlling Extraneous Variables**

Extraneous variables confound the results, they are also called confounding variables. There are four ways of controlling extraneous variables: randomization, matching, statistical control and design control.

**Randomization**

Randomization refers to the random assignment of test units to experimental groups by using random numbers. Treatment conditions are also randomly assigned to experimental groups. Randomization may not be effective when the sample size is small.

**Matching**

Matching involves comparing test units on a set of key background variables before assigning them to the treatment conditions.

**Statistical Control**

Statistical control involves measuring the extraneous variables and adjusting for their effects through statistical analysis (ANCOVA).

**Design Control**

Design control involves the use of experiments designed to control specific extraneous variables.

**LECTURE # 09****Experimental Designs**

Various experimental designs are described below.

**One-Shot Case Study**

Also known as the after only design, the one-shot case study may be symbolically represented as

$X \quad O_1$

**Static Group Design**

$X \quad O_1$   
 $O_2$

The treatment effect (TE) would be measured as  $TE = O_1 - O_2$ .

**Pretest-Posttest Control Group Design**

In the pretest-posttest control group design, test units are randomly assigned to either the experimental or the control group, and a pretreatment measure is taken on each group. This design is symbolized as:

$R \quad O_1 \quad X \quad O_2$   
 $R \quad O_3 \quad O_4$

The treatment effect (TE) is measured as

$$TE = (O_2 - O_1) - (O_4 - O_3)$$

This design controls for most extraneous variables. Selection bias is eliminated by randomization.

**Posttest-Only Control Group Design****Randomized Block Design**

A randomized block design is useful when there is only one major external variable, such as sales, store size, or income of the respondent that might influence the dependent variable.

**Latin Square Design**

A Latin square design allows the researcher to statistically control two non-interacting external variables as well as to manipulate the independent variable.

An example of Latin square design

|                 | Interest in the store |        |     |
|-----------------|-----------------------|--------|-----|
| Store patronage | High                  | Medium | Low |
| High            | B                     | A      | C   |
| Medium          | C                     | B      | A   |
| Low and none    | A                     | C      | B   |

**Experimental Settings**

There are two types of settings in which experiments conducted.

**Laboratory Experiment**

It is an artificial setting for experimentation in which the researcher constructs the desired conditions.

**Field Experiment**

An experimental location set in actual market conditions.

Laboratory experiments have some advantages over field experiments. The laboratory environment offers a high degree of control because it isolates the experiment in a carefully monitored environment.

**Limitations of Experimentation****Time**

Experiments can be time consuming.

**Cost**

Experiments are often expensive.

**Administration**

Experiments can be difficult to administer. It may be impossible to control for the effects of the extraneous variables, particularly in a field environment.

**Test marketing**

Test marketing, also called market testing, is an application of controlled experiment, done in limited but carefully selected parts of the marketplace called test markets. It involves a replication of a planned national marketing program in the test markets. Often, the marketing mix variables (independent variables) are varied in test marketing, and the sales (dependent variable) are monitored so that an appropriate national marketing strategy can be identified. The two major objectives of test marketing are:

1. To determine market acceptance of the product
2. To test alternative levels of marketing mix variables.

Test marketing procedures may be classified as standard test markets, controlled and min-market tests, and simulated test marketing.

**Standard Test Market**

It is a test market in which the product is sold through regular distribution channels. For example, no special considerations are given to products simply because they are being test-marketed.

The duration of the test depends on the repurchase cycle for the product, the probability of competitive response, cost considerations, the initial consumer response, and company philosophy. The test should last long enough for repurchase activity to be observed. If competitive reaction to the test is anticipated, the duration should be short. Recent evidence suggests that tests of new brands should run for at least 10 months.

**Controlled Test Market**

A test-marketing program conducted by an outside research company in field experimentation. The research company guarantees distribution of the product in retail outlets that represent a predetermined percentage of the market.

**Measuring and Scaling**

Measurement in marketing research is determining how much of a property/ characteristic is possessed by an object. Measurement is to determine the intensity of some characteristic of interest to the researcher.

Now what are we really measuring? We are not measuring objects but we are measuring some properties-called attributes or characteristics. Thus we do not measure buyers but their characteristics like their preferences or perceptions. Objects in marketing research are consumers, brands, stores, advertisements etc. Properties are characteristics of an object that can be used to distinguish one object from the other. Properties may be:

a. **Objective properties** which are physically verifiable characteristics such as age, income, number of cans purchased, store last visited and so on.

b. **Subjective properties** which cannot be directly observed and are mental constructs such as perceptions, attitudes. Subjective properties are observer-able and intangible into a rating scale. There are several examples of both these properties in marketing e.g. market potential for new product, sales of existing

product, demographic and psychographic characteristics of the buyers, effectiveness of a new advertising campaign, market share, and the like.

### **Rating scales**

Subjective properties e.g. attitude, beliefs, intentions, preferences etc. are measured with the help of rating scales usually called scales. In a scale numbers are assigned to the amount of characteristic or “construct” being measured. The number varies according to the amount of characteristic available in the object. There are four basic scales.

#### **1. Nominal scale**

A nominal scale is one in which number serve as labels to identify or categorize objects or events. All numbers are equal with respect to characteristics of objects. Each number is assigned to only one object and each object has only one number. The number in a nominal scale does not have any relationship with the amount of characteristic. For example a unique number is given to each player in a football team but player having a number 8 does not play better twice than the player having number 4.

Although nominal scales are used for the lowest form of measurement, yet nominal scales are frequently used in marketing research. Nominal level identification are needed in marketing research to identify brands, store types, sales territories customers, gender, geographic location, race, religion, buyer/non buyer heavy and light users etc. The numbers assigned to such categories are mutually exclusive. Alphabets, even symbols, could be used instead of numbers in nominal scales. Nominal scales simply label objects and do not provide information on greater than or less than. Usually counting is permissible operation in nominal scale. Thus statistics like frequency distribution, percentages, mode, chi-square etc. are used while analyzing data gathered by nominal scale. Average in these scales is meaningless.

## LECTURE # 10

### Rating scales

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#### 2. Ordinal Scale

An ordinal scale defines ordered relationship among the objects measured. It indicates relative size difference between objects. An ordinal scale shows whether an object has more or less of the attribute but not as to how much less or more. It shows relative position of the objects under measurement but not what the magnitude of difference is. World ranking of cricket teams, finishing order of horse race, positions of the students in the class and social class are examples of ordinal scales. In marketing research opinions, measurement of preferences, relative attitudes, evaluation of quality of different brands of the same product etc. are through ordinal scales. In ordinal scale difference of numbers indicate difference in rank and nothing else. The statistics commonly used in analyzing data gathered by ordinal scale is percentile, median, rank order correlation etc.

#### 3. Interval scale

One problem with the ordinal scale is that it defines the order of the objects but it does not tell about what is difference (or distance) between the objects. Interval scale shows that as the interval between the numbers on the scale represent equal increments of the attribute being measured, the differences can be compared. A difference between 25 and 26 is the same as between 26 and 27 which is same as between 27 and 28. The most common example of interval scale in life is that of thermometer. But as you know two types of thermometer, Celsius and Fahrenheit do not have a fixed or true zero or freezing point. Both the zeros and units of measurements are different although the amount of heat in various intervals on each thermometer will be same. Let us illustrate it with figures. Amount of heat between 88° and 89° on Fahrenheit is same as between 91°-92° but amount of heat between 88° and 89° on Fahrenheit is different from amount of heat between 88° and 89° on Celsius.

Statistical techniques that are used in nominal and ordinal scales can also be used in interval scale. In addition to that, statistics like mean, standard deviation, product moment correlation etc. can also be used in interval scale.

#### 4. Ratio scale

Ratio scale is one in which a true zero exist. True zero or absolute zero means that number zero is assigned to the absence of the characteristic being measured. Thus we can compute ratio of scale values. For example, it is possible to say how many times greater or smaller one object is than another. This is the only type of scale that allows making comparison of absolute quantities. We can say that market share of company A is twice as much as of company B. In market research, data on number of customers, costs, sales, market share and some other marketing variables are measured on ratio scales.

All statistical techniques can be applied to analyze ratio scale data. Summary of four basic rating scales is given below.

**Types of Rating Scale**

| Scale    | Nature                                                       | Application in marketing research                                                      |
|----------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Nominal  | Identification, labeling of objects                          | Classification by gender, location, social class. Identification of stores, brands etc |
| Ordinal  | Ordered relations according to more or less of the attribute | Ranking, preferences, merit list, positions in the tournament                          |
| Interval | Interval between adjacent ranks are equal                    | Attitude measurement, index numbers, temperature                                       |
| Ratio    | Absolute zero exists. Comparisons possible                   | Sales, income, age, units produced costs, market share                                 |

The scales are used in marketing research can be divided into two types: **Comparative and non-comparative scales**. In the first type, direct comparison of objects can be made with one another. Data in comparative scales have ordinal or rank order properties. Each object in non-comparative scaling is scaled independently of others in the set. The data in such scales is usually interval or ratio scaled. Likert scale, semantic differential or staple scales are the classification of itemized non comparative scales.

#### Comparative scales

First type of comparative scaling is **paired comparison scale**.

#### Paired Comparison Scale

A paired comparative scale is a technique in which respondent is presented with two objects at a time in the pair and asked to select one according to some criterion. It is like an ordinal scale in which two objects are ranked. Let us see the example.

We are presenting you with ten pairs of shampoo brands. Please indicate which one you like for your use.

|   | A | B | C | D | E |
|---|---|---|---|---|---|
| A | - | 1 | 1 | 0 | 0 |
| B | 0 | - | 0 | 0 | 0 |

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| C | 0 | 1 | - | 0 | 0 |
| D | 1 | 1 | 1 | - | 1 |
| E | 1 | 1 | 1 | 0 | - |
|   | 2 | 4 | 3 | 0 | 1 |

In the above table, we see that figure 1 in the box means that column brand is preferred to corresponding brand in row and a zero in the box means that brand in row is preferred to the corresponding column. For example in the first row B and C are preferred to A and A is preferred to D and E which is also depicted in first column. Likewise in the second row, B is preferred to all other brands i.e. A, B, C, D, E which is also reflected in second column.

Data in this matrix can be analyzed by finding out percentages of preferences. In this case brand A is preferred e.g. A is preferred by  $2/10 \times 100 = 20\%$ , B=40%, C=30%, D=0% and E=10%. Thus you can find out rank order of the five brands.

Paired comparison should be used if the number of brand is limited. In case the number of brands is large, then the exercise becomes unmanageable. Due to this difficulty, respondents cannot usually meaningfully rank more than five or six brands. Another problem with this technique is that the comparison of two objects at a time is seldom the way choices are really made in the marketplace. Thus a brand can be a first choice in paired comparison situation but performs poorly in actual marketplace. Paired comparison, however is most common method of testing the taste.

### Rank Order Scale

This scale is also comparative in nature. It involves asking the respondents to rank various brands/objects with regard to some criterion. For example a respondent may be asked to rank five print ads on the basis of awareness, it provides, liking of the respondent or intention to buy. Look at the following data.

### An Example of Rank-Order Scale

Please rank the following brands of fruit juices in order of preference from 1 to 7. rate your most preferred brand as 1 and least preferred brand 7; all others are in between. No. 2 brands will receive the same rating. There is no right or wrong answer: it is just matter of preference.

| Brand | Preference order |
|-------|------------------|
| A     | 2                |
| B     | 6                |
| C     | 4                |
| D     | 1                |
| E     | 7                |
| F     | 5                |
| G     | 3                |

This technique is frequently used in marketing research. Advantages of rank-order scaling include that it is simple concept, easy to administer and less time consuming to administer than other comparative scale such as paired comparison. The instructions for ranking objects are easy to comprehend. It is also said that the ranking made by the respondent is closer to his/her real purchase situation.

The major disadvantage of rank order scale is that it produces only ordinal data. It does not mean that first preference in the set is the most liked. It may be “least disliked” in the set.

### Constant-Sum Scale

In constant-sum scale respondents are required to allocate a fixed number of rating point (usually 100) among several objects. It is widely used to measure the relative importance of various attributes of the object. See the following example.

Please divide 100 points among the following characteristics of a tooth paste that reflects the relative importance of each characteristic to you in the selection of toothpaste. If an attribute is unimportant to you, assign zero.

|                           |     |
|---------------------------|-----|
| Taste                     | 8   |
| Fragrance                 | 7   |
| Tube                      | 5   |
| Cleanliness of teeth      | 35  |
| Prevention of tooth decay | 25  |
| Price                     | 2   |
| Quality                   | 8   |
| Shining of the teeth      | 10  |
| Total                     | 100 |

The relative importance of the attributes is determined by the counting the points assigned by all respondents and dividing by the number of respondents.

The main merit of the constant sum scale is that it permits fine distinction of attributes of an object without much time. However it may be difficult to allocate points to several categories. The main disadvantage of this scale is that respondents may allocate points that exceeds or are short of the required total say 103<sup>o</sup> or 97<sup>o</sup> instead of 100.

## LECTURE # 11

As stated early, in non-comparative scale, objects are scaled independently of other objects in the set that is the reason; non comparative scales are also called monadic scales.

Non-comparative scales are of two kinds: **continuous and itemized rating scales**

### Continuous Rating Scales

Continuous rating scale requires the respondents to indicate their position by rating the object on a continuum that **Non Comparative Scale**

runs from one extreme of criterion to the other. The format of this scale varies. Such a scale is also called graphic scale. See the following example.

How would you rate Airline A.?

Version A      bad    okay    Good    Very good      Excellent

Version B

**Worst                  0                  10                  20                  30                  40                  50                  60                  70                  80    90 100 Best**

Graphic rating scales are easy to construct but answers may be unreliable and analysis complicated. However use of computers has made the analysis easy and that has increased the use of continuous rating scales in marketing research.

### Itemized Rating Scales

An itemized rating scale contains numbers or brief descriptions or both in respect of the categories of response. Respondents select the categories that best describes their rating about the object in question. Itemized rating scales are Likert Semantic Differential and Staple scales.

#### Likert scale

This scale is named after Rensis Likert who developed this scale. Likert scale requires a respondent to show a degree of agreement or disagreement with a variety of statements about the related object. Respondents indicate how much they agree or disagree with the statement. This scale captures the integrity of the respondents' feelings. See the following example Likert Scale.

#### Instructions

Listed below are some statements about Jeans Y. Please indicate your degree of agreement or disagreement by encircling the appropriate answer.

| Statement                                  | Strongly Agree | Somewhat Agree | Neutral | Somewhat Disagree | Strongly Disagree |
|--------------------------------------------|----------------|----------------|---------|-------------------|-------------------|
| a. Jeans Y are easy to identify on someone | 1              | 2              | 3       | 4                 | 5                 |
| b. Jeans Y make me feel good               | 1              | 2              | 3       | 4                 | 5                 |
| c. Jeans Y are good looking                | 1              | 2              | 3       | 4                 | 5                 |
| d. Jeans Y are reasonably priced           | 1              | 2              | 3       | 4                 | 5                 |

|                                                   |   |   |   |   |   |
|---------------------------------------------------|---|---|---|---|---|
| e. Jeans Y<br>will be my<br>next pair of<br>Jeans | 1 | 2 | 3 | 4 | 5 |
|---------------------------------------------------|---|---|---|---|---|

The score of each item by all the respondents in Likert Scale are summed up and average is drawn. Due to this reason, Likert scale is also known as summated scale.

### Semantic Differential Scale

This scale has been borrowed from another area of research called “semantics”. This scale contains a series of bipolar adjectives from the various characteristics of the object under study and respondents indicate the impression of each characteristic by indicating the appropriate place on the continuum. It is usually seven point rating scale having two poles (adjectives) e.g. “friendly unfriendly” “high quality-low quality” “convenient-inconvenient” or “dependable-undependable”. Having seven separators between two poles is mandatory. While using the semantic differential scale, the respondent marks the blank that is closer to his rating. Look at the following example: Please indicate your impression about Restaurant A by marking the line that best describes your opinion.

Quick service ----- slow service  
High prices----- low prices  
Good quality ford ----- low quality ford  
Limited variety of ford ----- wide variety of ford  
Poor location ----- good location

Semantic Differential Scale is gaining popularity because of its versatility. This scale is used extensively in comparing different brands, company images or stores. Mean is the statistics which is used in Semantic Differential Scales.

### Staple Scales

Jan Staple developed this scale and therefore this scale is called Staple scales. Typically a Staple scale has ten categories of measurement ranging from -5 to +5 and usually shown vertically. Categories may be reduced if the researcher chooses to. Respondents select a category and mark the selected number to indicate his rating. Higher the positive score better the adjective describes the object. Stable scale uses one pole rather than opposite poles. It is easier to construct and administer. It is equally suited to telephone interviewing. Look at the following example.

Please rate bank A with regard to their “fast service” and “friendly environment” on the following scale.

|                      |              |
|----------------------|--------------|
| +5                   | +5           |
| +4                   | +4           |
| +3                   | +3           |
| +2                   | +2           |
| +1                   | +1           |
| Friendly environment | Fast service |
| -1                   | -1           |
| -2                   | -2           |
| -3                   | -3           |
| -4                   | -4           |
| -5                   | -5           |

### Development of Rating Scales

Rating scales take different forms as you have seen above. While using a rating scale in his/her research, the researcher has to choose among several alternatives. The researcher must make decisions regarding the scales on these aspects.

- a. How many categories in the scale?
- b. Should the number of categories be odd or even?
- c. Should the scale be balanced or unbalanced?
- d. Should the choices be forced or unforced?
- e. Degree of verbal description.
- f. The final form (physical) of the scale.

### 1. How Many Categories in the Scale

There is no ideal number of categories in a scale. They could be as many as 13 or as few as 3. Number of categories provide for finer discrimination by the respondents but sometimes it is very difficult for the respondents to handle many categories. They really cannot discriminate. If the respondents are quite knowledgeable large number of categories can be used otherwise small number may be employed.

In telephonic interview smaller number is appropriate. If you have limited space on the paper, use small number of categories. For marketing research five to seven categories are commonly used in rating scales.

### 2. Odd or Even

If you should provide a neutral point in the rating scale, then use odd number but if you think there will be no neutral respondent or you want to force the respondents to give some answer, then use even number.

### 3. Balanced or Unbalanced Scale

A rating scale is balanced when it has equal number of favorable and unfavorable responses. See the following scales.

#### Unbalanced Scale

The taste of drink A is.

Extremely delicious  
Very delicious  
Delicious  
Poor  
Very poor  
Extremely poor

#### Balanced Scale

The taste of drink A is.

Extremely delicious.  
Very delicious  
Delicious  
Delicious to some extent  
Poor  
Very poor

Usually the rating scales are balanced. Balanced scales provide more objective data.

### 4. Forced Scales versus Non Forced Scales

Forced scales forces the respondents to express an opinion as no provision is made for “no opinion”. But if the researcher thinks that many respondents will have no opinion on the issue, the scale contains a category of “no opinion”. Such a scale is called non forced scale.

### 5. Degree of Verbal Description in a Scale

The description of scale of categories may be numerical, verbal and even pictorial. Researcher has a choice to label all or sometimes only categories on the extremes are verbally labeled. However some people think that confusion in the scale can be reduced by labeling all scale categories.

## **LECTURE # 12**

### **Physical Form of Scale**

Scale may have different physical forms. Researcher can exercise different options: horizontal, vertical, boxes, lines or number assigned on a continuum. Positive or negative values may be used. For children different shapes of faces (happy or otherwise) can indicate the choice of respondents. Examples of different configuration of scales are shown below.

### **Physical Configuration of Rating Scales**

Very powerful

Powerful

Some what powerful

Nether neither weak nor powerful

Some what weak

Weak

Very weak

Similarly verbal descriptors in the scale may change with the nature of construct being measured. Some com mostly used descriptors of scales are used in the following example.

| <b>Construct</b>      | <b>Descriptors</b>  |                     |                               |                   |                     |
|-----------------------|---------------------|---------------------|-------------------------------|-------------------|---------------------|
| Frequency of purchase | never               | casually            | Some times                    | Often             | Most often          |
| Attitude              | Very negative       | Negative            | Neither negative nor positive | Positive          | Very positive       |
| Consumer satisfaction | Highly dissatisfied | Not satisfied       | Neutral                       | Satisfied         | Quite satisfied     |
| Intention to purchase | Will not buy at all | Inclined not to buy | Might or might not buy        | Probably will buy | Will buy definitely |

### **Accuracy of Measurement**

When we measure through scales or otherwise, a measured value is not the true value of the characteristic that we are measuring, it is rather the value that we observed. These two values may be different. This difference is called measurement error. Measurement error may be caused by many potential sources of errors, some of which are mentioned below:

- 1) Personal factors such as fatigue, mood, health.
- 2) Situational factors such as noise, pressure of other people, distracters.
- 3) Intelligence, education etc. of the respondents.
- 4) Variation in the method of interview such as telephonic interview, face to face interview or mailed questionnaire.
- 5) Measuring instrument factors which include ambiguity of question. Lack of clarity in instruction.
- 6) Data analysis factors such as errors made in coding and tabulation process.

There are two components of total measurement error: systematic error and random error. Systematic error causes a constant bias in the measurement. Some errors would occur at the time of measurement each time. Suppose we measure the speed of swimmers with the help of a stop watch which systemically runs fast. Each time we measure the speed of swimmer same type and same amount of error would occur. This is called systematic error. Random error on the other hand is not constant. This bias in the measurement is a random manner. Supposing we use many stop watches to record our time. Such recorded time falls within a range around the true time. Hence the error is not systematic but random. Systematic errors represent the stable factor that affects the observation/ measurement in the same manner each time but random error is caused by random changes or differences in measurement situations or respondents.

Thus observed score is comprised of true score plus systematic error plus random error. This relationship can be shown in the following equation.

$$O_m = T_m + S_e + R_e$$

Where

$O_m$  = observed measurement

$T_m$  = true measurement

$S_e$  = systematic error

$R_e$  = random error

Let us now try to understand the concept of validity and reliability.

### **Validity**

A measure has validity if it measures what it is supposed to measure. In other words, the differences in the observed scores reflect the differences among the objects or individuals on the measured characteristics. Validity is the accuracy of measurement. To what extent measurement is free from both systematic and random error is validity of measurement.

Some types of validity are face, predictive, convergent and discriminant validity.

### **Face or Content Validity**

It is concerned with the degree to which the measurement “looks like” that it measures what it is supposed to measure. It is a judgment by the researcher. For example if the respondent recognizes the advertisement, it can usually be accepted at face as if the respondent has been exposed to the ad in the past. Unfortunately this is the weakest method of assessing the validity of questions. It can be improved by having other researchers critique the measurement instrument.

### **Predictive Validity**

If the measure can predict some future event the measuring instrument is supposed to have predictive validity. For example, a measure of brand preference or buying intention is valid if it can be shown that those who have strong brand preference or intention to buy actually bought the brands. Predictive validity is very important for decision making which establishes predictive validity.

### **Convergent Validity**

If the researcher uses two different methods or sources of data collection for the same information and both agree, the measure is said to have convergent validity. In convergent validity, one measure correlates with other on that characteristic. In a survey 214 questionnaires were left with the household head in the morning and collected back in the evening. On the basis of that questionnaire, average age of the household was calculated as 17.2 years. Then 40 questionnaires were picked at random and another member of the household was asked about the ages of the household on telephone. Average age was 17.1 years which is pretty close. Hence questionnaire had convergent validity.

### **Discriminant Validity**

In discriminant validity, questions that measure different objects should yield different result. If the researcher knows that these are real differences, he/she should find that actually the responses differ. If two questions measure concern about theft security and fire-security then theft. If there are no differences between these two constructs, there is a doubt about the validity of the instrument.

### **Reliability**

Consistency of the instrument is called reliability. If the measurement of the same group is made repeatedly by the same scale the results should be consistent. If there is a systematic error in the instrument it does not affect the reliability of the instrument; random error does. Therefore reliability can be defined as the extent to which instrument is free from random error.

Random error is the cause of inconsistency and produces lower reliability. If  $E_R=0$ , reliability is highest. What is the association between the measurements obtained when the scaled is administered at different times determines the reliability. Scale is consistent and reliable if such an association is high. How can we assess reliability? There are three methods test retest, alternative forms and internal consistency methods.

#### **1. Test-Retest Reliability**

It involves repeated measurement of the same respondent/s using the same scale under almost similar or equivalent conditions. The result of both time measurements is compared. If the discrepancy is great, random error is great and therefore reliability is low. On the contrary, if the scores are similar, amount of random error is small and reliability of high. How the similarity of two measurements is determined is through finding the correlation. If the coefficient of correlation is high, the reliability is supposed to be high.

There are a number of problems associated with this approach to reliability. Firstly, it appears to be sort of illogical and sometime impossible to measure the same subject/s twice as is the case of mall intercept. Second interval of time between test and retest influences the reliability. It has been found that all other things remaining equal, reliability is lowered when the time interval between two tests increases and vice versa. Third, first measurement may change the second response of the subject. It is possible that the respondents might have remembered the answers that they gave in the first instance. Fourth, there may be change in the attitude of the respondent after one and administration of the subjects towards high fat milk may make the respondent think about his/her health and change his/her score in the retest. Finally the situational factors may change causing an alteration in the second measurement. It is therefore suggested that retest reliability approach can best be used with other approaches to reliability.

#### **2. Alternative Forms Reliability**

In this approach, two equivalent alternative forms of scale/ instrument are constructed and administered to the same group of subject at two different times. The scales are equivalent but not identical. Time interval between administrations of two scales is two to four weeks. Each time different set of scale compared to find similarity or discrepancy. Degree of similarity is determined by correlation. This approach is known as alternative form reliability. One, it is time consuming and expensive as you have to develop an alternative form of scale. Thus delay occurs, two, it is difficult to make both the instruments equivalent as far as the constant is concerned.

#### **3. Split Half Reliability**

Split half reliability is the simplest measure of interval consistency. It involves preparing a multi-item scale and then dividing it into two halves and correcting the item responses of these two halves. If the correction is high, it shows high interval consistency and hence high reliability. Split-half reliability is really another version of alternative-forms techniques except that split half technique is used to indicate that the items are measuring the same characteristic. The problem

with this technique is that the result depend on low the splitting of item is made. One way to split the scale into two halves of odd and even numbered items, another way is to divide them randomly.

## LECTURE # 13

### Sampling

Marketing research would not exist today without sampling. Almost all marketing studies require to select a sample to collect data. Sample may be that of customers, stores, households, organizations etc. according to the nature of research. It is useless to survey the entire population due to budget and time constraint. To obtain information from every unit of population is impossible and in most cases not practical. This is one reason for the marketer to choose a sample. Census is opposite of the sample. Census means the entire population. In some cases census may be used instead of the sample. Let us familiarize our-self with these three terms: Population, Census and Sample.

**Population** means all the elements which have those characteristics that we want to measure through the process of research. It is for the purpose of research. Population is the entire group of study for the research at hand.

**Census** is complete counting of population. The characteristics of population called parameters can easily be measured by the researcher if census is used. The researcher does not need to apply any formula etc. to find out the parameters, he/she can find it right away by surveying census.

**Sample** is a portion of the population that represents a population. It is a representative subset of the population selected for the purpose of study. Sample unit is the basic level of investigation.

### What should be used: Census or Sample

Usually the researcher works with sample due to limitation of time and budget available. Definitely a census is time taking and expensive to conduct. But if the census is small, it is feasible to conduct the census. Census may be used instead of sample if the following conditions are prevailing.

1. Population size is small
2. Research budget is plenty
3. Variance in the characteristic that researcher is measuring is large
4. Measurement is non-destructive ( A sample unit is not destroyed or consumed when tested)
5. Study is not a secret
6. Cost of sampling error is high

On the other hand, use of a sample would be appropriate if following conditions exist.

1. Size of the population is large
2. Money available for research is small
3. Time available for study is short
4. Sampling error cost is low
5. Measurement process is destructive ( A sample unit is destroyed or consumed when tested)
6. Variation in the characteristic that research is measuring is low

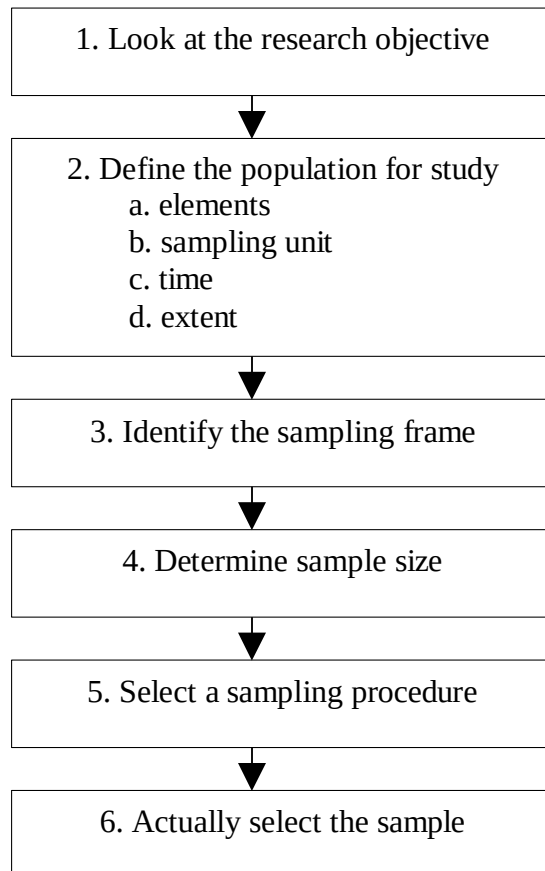
In general sample is used in marketing research. Census is used only in exceptional circumstance. One more reason favoring the use of sample is that analyzing the voluminous data generated by the census is very difficult as compared to the small data collected through sample. We can sum up the benefit of sample as follow:

1. Sample saves money
2. Sample saves time
3. Sample may be more accurate (due to less non-sampling error)

4. Sample is better if the measurement or testing destroys or consume the elements in the process of research

### Sampling Process

Sampling process consists of a series of steps followed in a sequence. The steps are listed below.



We will explain these steps in details

#### 1. Look at the Research Objectives

As you know, research objectives include the information needs, research questions, research hypotheses and research boundaries.

The researcher should re-study these objectives as the second step i.e definition of population entirely depends on the research objectives. In fact, research objectives provide foundation for every other stop in the research process like sampling, tool of research, data analysis techniques etc. Research objectives are available in the document called research proposal.

#### 2. Define the Population for Study

This is the basic and most important step of the sampling process. The researcher must specify the population which is the target of the study. It does not comprise of human population always. It may be collection of objects, products, stores, branches, or human being. The target population for study should be defined in exact and not in vague terms. Imprecise definition of the population is

50

3. A list of households within the selected residential areas
4. List of males over 40 years in each household

Please note that sometimes an accurate, up-to-date list of sampling units may not be available. Thus it becomes problematic to obtain an accurate sampling frame. Sometimes, even the list does not exist at all. For example, if you want to find out a list of midgets in Pakistan, probably it is not available. Similarly a list of allergy sufferers is not available too. Moreover, government lists (of industrial units for example) may not be up to date. The industrial units established within the last six months may not have been added in the list. The researcher in this case will have to edit or construct a list on his/her own to avoid sampling frame error. Sometimes, there is neither physical list nor it can be constructed. In this case sampling frame becomes a matter of whatever access to population a researcher can think of, for example “all shoppers who buy over Rs. 500 worth of merchandise at departmental store Y during first week of October 2007”. Here is no list of shopper but a stream of shoppers.

A sampling frame error occurs if the listing of population in the sampling frame is inaccurate or out of date.

### **Determine the Sample Size**

Sample size refers to the number of elements of the population to be included in the sample for study. Deciding on the sample size is not a simple exercise: it has an element of complex city.

Some qualitative and quantitative considerations are involved in determining the size of the sample for the study.

How large a sample should be. There are some statistical tools available to determine the sample size which will be discussed later. Here are some factors and practical approaches for determining the sample size.

#### **Resource Constraints**

In marketing research, amount of money and time available for the project may be limited. Availability of trained and qualified personnel may be a constraint as well. It influences the size of the sample that it will push the size towards smaller side. It can be done to some extent. If the researcher feels that budget and time is tight that very few units can be included in the sample which will not be good enough for the study, the research probably should not be undertaken. In order to determine the size of sample on the basis of budget, the fixed cost and variable cost per respondent be calculated and then the sample size be determined. In fact, it is an issue whether the budget should dictate the sample size or the sample size should determine the budget. The latest thinking is that the research activities and the sample size should become the basis for the research project. The budget dictate the sample size is considered to be a backward thinking and should be avoided as far as possible.

#### **Comparable Studies**

Another approach to deciding on the sample size is to find out what sample size has been used by similar. The studies should be similar in terms of number of groups used. They should also have achieved a desirable level of reliability. If there are many similar studies, then an average may be drawn.

#### **What the Client Says**

Sometimes clients also aware of research techniques, in such cases, the client may suggest a sample size. If he/she is quality conscious, he may ask for the large sample. On the contrary if he/she is cost conscious, a small sample size is suggested. Sometimes, it becomes important to accommodate clients' point of view on this issue.

#### **Rule of thumb**

This is an arbitrary statement that the researcher would follow while deciding on the size of the sample. “It should be at least 3% of the population” “It should not be less than 1% of population”. The researcher knows the objectives of the research. As such he/she knows the number of groups, small and large. He therefore uses some intuitive feeling and common sense in selecting a sample. One rule of thumb about the sample size is that when you are using groups in your research then there should be at least 100 units in a major group and at least 30 in a subgroup.

## LECTURE # 14

### Other Factors Affecting the Sample Size

In addition to the factors mentioned above, some more factors could influence the sample size. These are as follow:

**1. Variability** in the population. If the population is very heterogeneous, the sample will be divided into groups with an implication that the sample size would be larger. Likewise if the research requires multivariate analysis, the sample size has to be large. If the population is homogenous and analysis is at the aggregate level then the sample will be small.

**Precision:** If the decision to be made on the basis of research is important, then accuracy of data is a primary concern of the researcher. This calls for larger sample. Data must be obtained more precisely.

These concepts may be used to determine sample size through a method called statistical method. Before we apply this method, let us be familiar with some statistical terms.

### Some Important Statistical Terms

#### Parameter

➤ Parameter is the summary measurement of the population or census.

#### Statistic

➤ Opposite to the parameter is the statistic. Statistic is the summary measurement of the sample. It is used to estimate the population.

#### Confidence Level

➤ Confidence level is the probability with which we can say that our true value lies within certain interval. This is called confidence interval.

#### Precision Level

➤ Precision level is the allowable error between the parameter and statistical value.

#### Variability

➤ In statistics variability is measured by variance or standard deviation. Standard deviation is the average distance of all the units from the mean. In marketing research usually 95% or 99% confidence level is used.

### Corresponding 'Z' Values

- 'Z' value of 95% confidence level is 1.96
- 'Z' value of 99% confidence level is 2.58
- 'Z' value of 99.7% confidence level is 3.0

### How to determine Standard Deviation?

- Standard deviation can be taken from secondary data.
- If you are an expert researcher then you can estimate the standard deviation.
- Third option is to take the sample of 30 and measure its actual standard deviation

## Steps for Determining the Sample Size Statistically

- Define precision level (e.g.  $\pm 1$ ,  $\pm 2$  etc).
- Precision level varies from research to research and according to the objectives of the research.
- Define confidence level (e.g. 90%, 95% etc).
- Determine corresponding Z value for confidence level.
- Determine standard deviation.

### Symbols used

- **e = Precision level**  
(error  $\pm$ )
- **s = Standard deviation**  
( $\sigma$ )
- **z = Confidence level**
- **n = Sample size**

- **Formula used for determining sample size is:**

$$n = S^2 Z^2 / e^2$$

- After using this formula, the answer obtained about the sample size might be in fraction.

### Examples for Determining Sample Size

#### Example I

- We want to obtain mean age of a magazine subscriber at 99% confidence level. We want our result to be  $\pm 2$  of the true mean age. Suppose standard deviation is 5. What should be the sample size?

- **Solution:**

$$\begin{aligned} e &= \pm 2 \\ s &= 5 \\ z &= 2.58 \\ n &= s^2 z^2 / e^2 \\ n &= (5)^2 (2.58)^2 / (2)^2 \\ n &= 41.6 \text{ or } n = 42 \end{aligned}$$

#### Example II

- A dairy company wants to determine the average consumption of milk per household that should be within  $\pm 1.5$  liter of the actual consumption. Past trend indicates that average variation in milk consumption per household is 4.5 liter. What should be the sample size if 95% confidence level is required?

➤

- **Solution:**

$$\begin{aligned} e &= \pm 1.5 \\ s &= 4.5 \end{aligned}$$

$$z = 1.96$$

$$n = s^2 z^2 / e^2$$

$$n = (4.5)^2 (1.96)^2 / (1.5)^2$$

$$n = 34.5 \text{ or } n = 35$$

➤ If we know value of 'n' and missing anyone among precision level, standard deviation or 'z' value then this unknown value can also be determined by using the same formula:

$$n = s^2 z^2 / e^2$$

### Example III

➤ A researcher wants to find monthly amount spend on lunch in restaurants. Researcher wants to be 95% confidence that the results are within  $\pm$  Rs. 100. What will be the sample size if the standard deviation is estimated to be Rs.400?

➤ **Solution:**

$$e = \pm 100$$

$$s = 400$$

$$z = 1.96$$

$$n = s^2 z^2 / e^2$$

$$n = (400)^2 (1.96)^2 / (100)^2$$

$$n = 61.44 \text{ or } n = 62$$

➤ This shows that the researcher should take 62 people as sample in order to estimate average income spent on lunch by the professionals.

- When we increase the precision level, error decreases and sample size increases and vice versa.
- When we increase the standard deviation then sample size increases.
- When we increase confidence level then sample size increases.

## LECTURE # 15

### Sampling Techniques

- Sampling techniques may be broadly classified as non-probability and probability.
- Non-probability sampling relies on the personal judgment of the researcher rather than chance to select sample elements. The researcher can arbitrarily or consciously decide what elements to include in the sample. Non-probability sampling may yield good estimates of the population characteristics. However, they do not allow for objective evaluation of the precision of the sample results. The estimates obtained are not statistically projectable to the population.

### Commonly used non-probability sampling techniques include:

- Convenience sampling
  - Judgmental sampling
  - Quota sampling
  - Snowball sampling
- In Probability sampling, sampling units are selected by chance. Every potential sample need not have the same probability of selection, but it is possible to specify the probability of selecting any particular sample of a given size. Commonly used probability sampling techniques include:
- Simple random sampling
  - Systematic sampling
  - Cluster sampling
- *We will discuss in depth the above techniques and briefly touch on some others.*

### Non-Probability Sampling Techniques

#### Convenience Sampling

- Convenience sampling attempts to obtain a sample of convenient elements. The selection of sampling units is left primarily to the interviewer. Examples of convenience sampling include:
  - Use of students, church groups and members of social organizations
  - Mall intercept interviews without qualifying the respondents
  - Department stores using charge account lists
  - Tear-out questionnaires included in a magazine
  - “People on the street” interviews
- Convenience sampling is the least expensive and least time consuming of all sampling techniques. The sampling units are accessible, easy to measure and cooperative. In spite of these advantages, this form of sampling has serious limitations. Many potential sources of selection bias are present, including respondent self selection. Convenience samples are not representative of any definable population.
- Hence, it is not theoretically meaningful to generalize to any population from a convenience sample, and convenience samples are not appropriate for marketing research projects involving population inferences. Convenience samples are not recommended for descriptive or causal research, but they can be used in exploratory research for generating ideas, insights, or hypothesis.

Convenience samples can be used for focus groups, pre-testing questionnaires, or pilot studies. Nevertheless, this technique is sometimes used even in large surveys.

### **Judgmental Sampling**

➤ Judgmental sampling is a form of convenience sampling in which the population elements are selected based on the judgment of the researcher. The researcher, exercising judgment or expertise, chooses the elements to be included in the sample, because he or she believes that they are representative of the population of interest or are otherwise appropriate. Common examples of Judgmental sampling include:

- Test markets selected to determine the potential of a new product
- Purchase engineers selected in industrial marketing research
- Expert witness used in court
- Department stores selected to test a new merchandising display system

➤ Judgmental sampling is low cost, convenient and quick, yet it does not allow direct generalizations to a specific population. Judgmental sampling is subjective and its value depends entirely on the researcher's judgment, expertise, and creativity. It may be useful if broad population inferences are not required.

### **Quota Sampling**

➤ Quota sampling may be viewed as two-stage restricted judgmental sampling. The first stage consists of developing control categories, or quotas of population elements. The relevant control characteristics, which may include sex, age, and race, are identified on the basis of judgment. In other words, the quotas ensure that the composition of the sample is the same as the composition of the population with respect to the characteristics of interest. In the second stage, sample elements are selected based on convenience or judgment.

### **Snowball Sampling**

➤ In snowball sampling, an initial group of respondents is selected, usually at random. After being interviewed, these respondents are asked to identify others who belong to the target population of interest. Subsequent respondents are selected based on the referrals. This process may be carried out in waves by obtaining referrals from referrals, thus leading to a snowballing effect. A major objective of snowball sampling is to estimate characteristics that are rare in the population. Snowball sampling is used in industrial buyer-seller research to identify buyer-seller pairs. The major advantage of snowball sampling is that it substantially increases the likelihood of locating the desired characteristic in the population

## Probability Sampling Techniques

### Simple Random Sampling

- In simple random sampling (SRS), each element in the population has a known and equal probability of selection. Every element is selected independently of every other element. The sample is drawn by a random procedure from a sampling frame. This method is equivalent to a lottery system in which names are placed in a container, the container is shaken; and the names of the winners are then drawn out in an unbiased manner.
- The researcher first compiles a sampling frame in which each element is assigned a unique identification number. Then random numbers are generated to determine which elements to include in the sample.
- SRS has many desirable features. It is easily understood. The sample results may be projected to the target population. SRS suffers from at least four significant limitations. First, it is often difficult to construct a sampling frame that will permit a simple random sample to be drawn. Second, SRS can result in samples that are very large or spread over large geographic areas, thus increasing the time and cost of data collection.
- Third, SRS often results in lower precision with larger standard errors than other probability sampling techniques. Fourth, SRS may or may not result in a representative sample. Although samples drawn will represent the population well on average, a given simple random sample may grossly misrepresent the target population. For these reasons, SRS is not widely used in marketing research.

### Systematic Sampling

- In systematic sampling, the sample is chosen by selecting a random starting point and then picking every  $i^{\text{th}}$  element in succession from the sampling frame. The sampling interval,  $i$ , is determined by dividing the population size  $N$  by the sample size  $n$  and rounding to the nearest integer.
- Systematic sampling is less costly and easier than SRS, because random selection is done only once. Moreover the random numbers do not have to be matched with individual elements as in SRS. Systematic sampling is often employed in consumer mail, telephone, mall intercept and internet interviews.

### Stratified Sampling

- Stratified Sampling is a two-step process in which the population is partitioned into sub-populations, or strata. The strata should be mutually exclusive and collectively exhaustive in that every population element should be assigned to one and only one stratum and no population elements should be omitted. Next, elements are selected from each stratum by a random procedure, usually SRS. Stratified sampling differs from quota sampling in that the sample elements are selected probabilistically rather than based on convenience or judgment. A major objective of stratified sampling is to increase precision without increasing cost.
- The elements within a stratum should be as homogeneous as possible, but the elements in different strata should be as heterogeneous as possible. Variables commonly used for stratification include demographic characteristics, type of customer (credit card versus non-credit card), size of firm, or type of industry.
- Stratified sampling can be proportionate or disproportionate.

## **LECTURE # 16**

### **Stratified Sampling**

- Stratified Sampling is a two-step process in which the population is partitioned into sub-populations, or strata. The strata should be mutually exclusive and collectively exhaustive in that every population element should be assigned to one and only one stratum and no population elements should be omitted. Next, elements are selected from each stratum by a random procedure, usually SRS. Stratified sampling differs from quota sampling in that the sample elements are selected probabilistically rather than based on convenience or judgment. A major objective of stratified sampling is to increase precision without increasing cost.
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- Stratified sampling can be proportionate or disproportionate.

### **Proportionate Stratified Sampling**

- Sample size is proportionate to the size of population in each stratum. For example,

|   |                                   |     |     |     |    |       |
|---|-----------------------------------|-----|-----|-----|----|-------|
| ■ | Population Size of various strata |     |     |     |    |       |
| ■ | A                                 | B   | C   | D   | E  | Total |
| ■ | 450                               | 350 | 100 | 250 | 50 | 1200  |
| ■ | Sample Size                       |     |     |     |    |       |
| ■ | 90                                | 70  | 20  | 50  | 10 | 240   |

### **Disproportionate Sampling**

- Sample size is not proportionate to the size of population. For example,

|   |                                   |     |     |     |    |       |
|---|-----------------------------------|-----|-----|-----|----|-------|
| ■ | Population Size of various strata |     |     |     |    |       |
| ■ | A                                 | B   | C   | D   | E  | Total |
| ■ | 450                               | 350 | 100 | 250 | 50 | 1200  |
| ■ | Sample Size                       |     |     |     |    |       |
| ■ | 70                                | 60  | 30  | 50  | 30 | 240   |

### **Cluster Sampling**

- In cluster sampling, the target population is first divided into mutually exclusive and collectively exhaustive subpopulations, or clusters.
- The key distinction between cluster sampling and stratified sampling is that in cluster sampling, only a sample of subpopulations (clusters) is chosen, whereas in stratified sampling, all the subpopulations (strata) are selected for further sampling. The objectives of the two methods are also different. The objective of cluster sampling is to increase sampling efficiency by decreasing costs. The objective of stratified sampling is to increase precision. Elements within a cluster

should be as heterogeneous as possible, but clusters themselves should be as homogeneous as possible.

➤ A common form of cluster sampling is area sampling, in which the clusters consist of geographic areas, such as counties, housing tracts, or blocks. The distinguishing feature of the one-stage area sample is that all of the households in the selected blocks (or geographic areas) are included in the sample.

➤ Cluster sampling has two major advantages: feasibility and low cost. In many situations, the only sampling frames readily available for the target population are clusters, not population elements. Cluster sampling is the most cost-effective probability sampling technique. This advantage must be weighed against several limitations. Cluster sampling results in relatively imprecise samples and it is difficult to form heterogeneous clusters, because, for example, households in a block tend to be similar rather than dissimilar

### Other Probability Sampling Techniques

➤ In **sequential sampling**, the population elements are sampled sequentially, data collection and analysis are done at each stage, and a decision is made as to whether additional population elements should be sampled. The sample size is not known in advance, but a decision rule is stated before sampling begins. At each stage, this rule indicates whether sampling should be continued or whether enough information has been obtained.

➤ In **double sampling**, also called two-phase sampling, certain population elements are sampled twice.

### Comparison of Various Sampling Techniques

| Method                      | Strengths                                                                                      | Weaknesses                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Probability Sampling</b> |                                                                                                |                                                                                                                                     |
| Simple Random Sampling      | Projectable results,<br>Can be understood with ease.                                           | Sampling frame cannot be constructed easily, more expensive, precision not high, representativeness not sure if greater variability |
| Systematic Sampling         | Can work without sampling frame, implementation easier than simple random,                     | Representativeness can decrease.                                                                                                    |
| Stratified Sampling         | Can give more precision in findings. Takes care of variability as contain all sub populations. | Stratification variables cannot be identified and implemented easily. Cannot handle easily if many variables. More expensive        |
| Cluster Sampling            | Can economize on cost and time                                                                 | Lack precision, computation and interpretation of results difficult                                                                 |

| Method                          | Strengths                                                     | Weaknesses                                                                                                                          |
|---------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Non-Probability Sampling</b> |                                                               |                                                                                                                                     |
| Convenience Sampling            | Economical, less time consuming, convenient                   | Researcher's bias in selection, Representativeness missing, usually not recommended for conclusive (descriptive or causal) research |
| Judgmental Sampling             | Less cost, more convenient, least time consuming              | Subjective results. Generalization very tentative                                                                                   |
| Quota Sampling                  | Sample can be controlled for certain characteristics          | Bias in selection of units, representativeness not there                                                                            |
| Snowball Sampling               | Relevant units with needed characteristics easily identified. | Much time taking                                                                                                                    |

### **Mall Intercept Sampling**

■ Mall intercept or shopping center sampling presents some unique difficulties. Bias may be introduced by

- 1. selection of shopping center
- 2. part of the shopping center, and
- 3. Part of the day (time)

Let us examine each one in detail.

### **Selection of Shopping Center**

- A shopping center usually reflects primarily the kind of families which live in the area.
- There may be low income and high income areas.
- It is good to use several shopping centers in different areas to bring representation with respect to characteristics and income. If possible, several cities with diversity be selected for the purpose of research.

### **Selection of Location within the Shopping Center**

- Which part of the shopping mall should be selected: in the beginning, in the center or in the end. Probably all location turn by turn to improve representativeness.
- If appropriate, different entrances of (a big) parking lot.
- If the researcher has an interviewing facility at a longer distance, it might result into non-representativeness on account of refusals to go to the facility due to shortage of time.

**Part of the Day (Time) Selection**

- Different timings should be stratified as different people shop at different times.
- Women shop on weekdays, working people shop in the evenings, families shop on weekends. Sometime working people shop at the lunch hour.
- Likewise there is different kind of rush at different hours of the day. Evenings are usually the peak hours.
- Samples of shoppers should be taken at different hours of the day.

**Sampling Errors**

- There are different kinds of errors in research. One of them is called sampling error.
- The difference between the sample value (statistics) and true underlying population value (parameter) is termed as sampling error.
- Sampling error occurs due to size of the sample and sampling technique. Some methods can minimize sampling error
- A sampling error could be in sampling frame. A sampling frame error is the degree to which sampling frame (or list) fails to account for the population.
- Yellow pages and other telephone directories may contain sufficient sampling frame errors as these are not up-to-date. Some numbers are redundant while some others are not listed.

## ***LECTURE # 17***

### **Development of Questionnaire**

Questionnaire or form design is an important step in formulating a research design. Once the researcher has specified the nature of research design and determined the scaling procedures, they develop a questionnaire or an observational form.

#### **Questionnaire and Observation Forms**

➤ Survey and observations are the two basic methods for obtaining quantitative primary data in descriptive research. Both of these methods require some procedure for standardizing the data collection process so that the data obtained are internally consistent and can be analyzed in a uniform and coherent form. If 40 different interviewers conduct personal interviews or make observations in different parts of the country, the data they collect will not be comparable unless they follow specific guidelines and ask questions and record answers in a standard way. A standardized questionnaire or form will ensure comparability of the data, increase speed and accuracy of recording, and facilitates data processing.

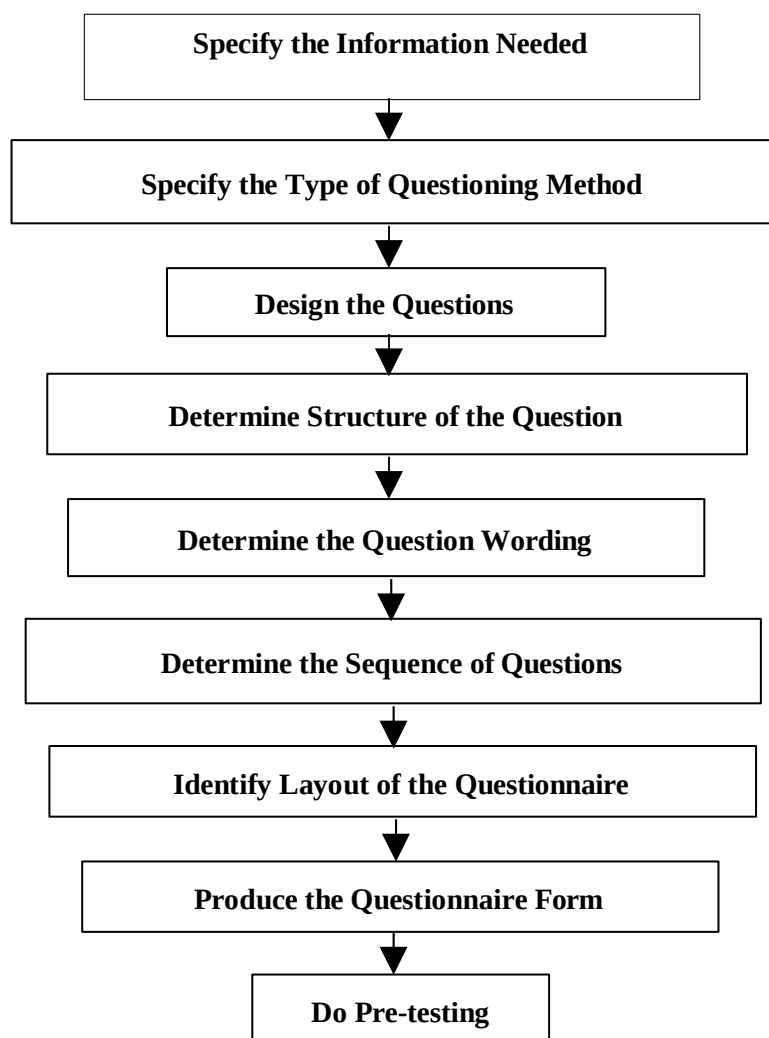
#### **Questionnaire Definition**

➤ A questionnaire, whether it is called a schedule, interview form or measuring instrument is a formalized set of questions for obtaining information from respondents.

#### **Objectives of a Questionnaire**

Any questionnaire has three specific objectives:

- First, it must translate the information needed into a set of specific questions that the respondents can and will answer.
- Second, a questionnaire must uplift, motivate and encourage the respondent to become involved in the interview, to cooperate and to complete the interview. A well designed questionnaire can motivate the respondents and increase the response rate.
- Third, a questionnaire should minimize response error. The response error is defined as the error that arises when respondents give inaccurate answers or their answers are miss-recorded or miss-analyzed. A questionnaire can be a major source of response error.

**Questionnaire Design Process****Specify the Information Needed**

➤ The first step in questionnaire design is to specify the information needed. This is also the first step in the research design process. It is helpful to review components of the problem and the approach, particularly the research questions, hypotheses and the information needed. It is also important to have a clear idea of the target population. The characteristics of the respondents group have a great influence on questionnaire design. Questions that are appropriate for college students may not be appropriate for housewives. Understanding is related to respondent socioeconomic characteristics. The more diversified the respondent group, the more difficult it is to design a single questionnaire that is appropriate for the entire group.

**Type of Interviewing Method**

➤ An appreciation of how the type of interviewing method influences questionnaire design can be obtained by considering how the questionnaire is administered under each method. In personal interviews, respondents see the questionnaire and interact face to face with the interviewer. Thus lengthy, complex and varied questions can be asked. In telephone interviews, the respondents interact with the interviewer, but they do not see the questionnaire. This limits the type of

questions that can be asked to short and simple ones. Mail questionnaires are self administered, so the questions must be simple and detailed instructions must be provided.

### **Individual Question Content**

- What to include in individual questions?

### **Is the Question Necessary?**

- Every question in a questionnaire should contribute to the information needed or serve some specific purpose. If there is no satisfactory use for the data resulting from a question, that question should be eliminated.
- It is useful to ask some neutral questions at the beginning of the questionnaire to establish involvement and rapport, particularly when the topic of the questionnaire is sensitive or controversial. Sometimes filler questions are asked to disguise the purpose or sponsorship of the project. Rather than limiting the questions to the brand of interest, questions about competing brands may also be included to disguise the sponsorship.

### **Are Several Questions Needed Instead of One?**

- “Do you think Cola A is a tasty and refreshing soft drink? **(Incorrect)**
- Such a question is called a double-barreled question, because two or more questions are combined into one. To obtain the required information, two distinct questions should be asked:
  - “Do you think Cola A is a tasty and soft drink?” and
  - “Do you think Cola A is a refreshing soft drink?” **(Correct)**

### **Overcoming Inability to Answer**

- Researchers should not assume that respondents can provide accurate or reasonable answers to all questions.

### **Is the Respondent Informed?**

- A husband may not be informed about monthly expenses for groceries and department store purchases if it is the wife who makes these purchases, or vice versa. Research has shown that respondents will often answer questions even though they are uninformed.
- In situations where not all respondents are likely to be informed about the topic of interest, filter questions that measure familiarity, product use and past experience should be asked before questions about the topic themselves. Filter questions enable the researcher to filter out the respondents who are not adequately informed.

### **Can the Respondent Remember?**

- Many things that we might accept everyone to know are remembered by only a few. Test this out on yourself. Can you answer the following?
  - What is the brand name of the trouser you were wearing three weeks ago?
  - What did you have for dinner two weeks ago?
  - What you were doing a month ago at noon?
  - How many liters of soft drinks did you consume during the last three weeks?
- These questions are incorrect as they exceed the ability of the respondents to remember. Evidence indicates that consumers are particularly poor at remembering quantities of products consumed. Thus, Soft drink consumption may be better obtained by asking:
  - How often do you consume soft drinks in a typical week?

- Less than once a week
- One to three times per week
- Four to six times per week
- Seven or more times per week

### **Can the Respondent Articulate?**

➤ Respondents may be unable to articulate certain type of responses. For example, atmosphere of the department store. If the respondents are unable to articulate their responses to a question, they are likely to ignore that question and may refuse to respond to the rest of the questionnaire. Thus respondents should be given aids, such as pictures, maps, and descriptions to help them articulate their responses.

### **Overcoming Unwillingness to Answer**

➤ If respondents are able to answer a particular question, they may be unwilling to do so, either because too much effort is required. The situation or context may not seem appropriate for disclosure, no legitimate purpose or need for the information requested is apparent, or the information requested is sensitive.

### **Effort required of the Respondents**

➤ The researcher should minimize the effort required of the respondents. Suppose the researcher is interested in determining from which departments in a store the respondent purchased merchandise on the most recent shopping trip. This information can be obtained in at least two ways.

➤ Please list all the departments from which you purchase merchandise on your most recent shopping trip to a department store. **(Incorrect)**

➤ In the list that follows, please check all the departments from which you purchased merchandise on your most recent shopping trip to a department store:

- Women's shoes
- Men's apparel
- Children's apparel
- Cosmetics

➤.

➤.

➤.

➤ Jewelry

➤ Other (please specify)

➤ The second option is preferable, because it requires less effort from respondents.

### **Context**

➤ Some questions may seem appropriate in some contexts but not in others. For example, questions about personal hygiene habits may be appropriate when asked in a survey sponsored by the Pakistan Medical Association, but not in one sponsored by a fast food restaurant. Respondents are unwilling to respond to questions that they consider to be inappropriate for the given context.

### **Legitimate Purpose**

➤ Respondents are also unwilling to divulge information that they do not see as serving a legitimate purpose. Why should affirm marketing cereals want to know their age, income and occupation? But a statement such as, "To determine how the consumption of cereal and

preferences of cereal brands vary among people of different ages, incomes and occupations, we need information on...” can make the request for information seem legitimate.

**Sensitive Information**

➤ Respondents are unwilling to disclose, at least accurately, sensitive information because this may cause embarrassment or threaten the respondent’s prestige or self-image. Sensitive topics include money, family life, political and religious beliefs, and involvement in accidents or crimes.

**Increasing the Willingness of Respondents**

➤ Place sensitive topics at the end of the questionnaire. By then, initial mistrust has been overcome, rapport has been created, legitimacy of the project has been established and respondents are more willing to give information.

➤ Preface the question with a statement that the behavior of interest is common. For example, before requesting information on credit card debt, say, “Recent studies show that most Pakistanis are in debt.” This technique is called the use of counter biasing statement.

## LECTURE # 18

### Designing a good research questionnaire...contd

#### Choosing Question Structure

A question may be unstructured or structured.

#### Unstructured Questions

Unstructured questions are open-ended questions that respondents answer in their own words.

They are also referred as free-response or free-answer questions. For example;

- What is your hobby?
- What is your favorite political party?
- Open-ended questions are good as first questions on a topic. Respondents are free to express any views. Their comments and explanations can provide the researcher with rich insights. Hence, unstructured questions are useful in exploratory research.
- A principal disadvantage is that potential for interviewer bias is high. Whether the interviewers record the answers verbatim or write down only the main points, the data depend on the skill of the interviewers.
- Another major disadvantage of unstructured questions is that the coding of responses is costly and time consuming. To summarize responses in a format useful for data analysis and interpretation can be extensive.

#### Structured Questions

- Structured questions specify the set of response alternatives and the response format. A structured question may be multiple choices, dichotomous or a scale.

#### Multiple-choice Questions

- In multiple-choice questions, the researcher provides a choice of answers and respondents are to select one or more of the alternatives given. Consider the following question:
  - Do you intend to buy anew house within the next three months?
  - Definitely will not buy
  - Probably will not buy
  - Undecided
  - Probably will buy
  - Definitely will buy
  - Other (please specify)
- The response alternatives should include the set of all possible choices. The response alternatives should be mutually exclusive. Respondents should also be able to identify one, and only one, alternative, unless the researcher specifically allows two or more choices.
- Order or the position bias is the respondents' tendency to check an alternative merely because it occupies a certain position or is listed in a certain order. Respondents tend to check the first or the last statement in a list, particularly the first. Each alternative should appear once in each of the extreme positions, once in the middle and once somewhere in between.
- Multiple-choice questions overcome many of the disadvantages of open-ended questions, because interviewer bias is reduced and these questions are administered quickly. Also, coding and processing of data are much less costly and time consuming. In self-administered questionnaires, respondent cooperation is improved if the majority of the questions are structured.

➤ Disadvantages are considerable effort is required to design effective multiple-choice questions. It is difficult to obtain information on alternatives not listed. Even if an “Other (please specify)” category is included, respondents tend to choose among the listed alternatives. There is also the potential for order bias.

### **Dichotomous Questions**

A dichotomous question has only two response alternatives: yes or no, agree or disagree, and so on. Often, the two response alternatives of interest are supplemented by a neutral alternative, such as “no opinion,” “don’t know,” “both” or “none.” For example:

Do you intend to buy a new house within the next three months?

- Yes
- No
- Don’t know

Issue in the design of dichotomous questions is whether to include a neutral response alternative. If it is not included, respondents are forced to choose between “Yes” and “No” even if they feel indifferent. On the other hand, if a neutral alternative is included, respondents can avoid taking a position on the issue, thereby biasing the results.

➤ We offer the following guidelines:

If a substantial proportion of the respondents can be expected to be neutral, include a neutral alternative. If the proportion of neutral respondents is expected to be small, avoid the neutral alternative.

### **Scales**

Scales were discussed in detail in chapter 8 and 9.

### **Choosing Question Wording**

Deciding on question wording is perhaps the most critical and difficult task in developing a questionnaire. To avoid the problems, we offer the following guidelines:

- Define the issue
- Use ordinary words
- Avoid ambiguous words
- Avoid leading questions
- Avoid implicit alternatives
- Avoid implicit assumptions
- Avoid generalization and estimates
- Use positive and negative statements

### **Define the Issue**

A question should clearly define the issue being addressed. Consider the following question:

- Which brand of soap do you use? (**Incorrect**)
- A better wording for this question would be:
- Which brand or brands of soap have you personally used during the last month? In case of more than one brand, please list all the brands that apply. (**Correct**)

### **Use Ordinary Words**

Ordinary words should be used in a questionnaire and they should match the vocabulary level of the respondents. For example, education as for certain respondents groups, the education level is very low. Technical jargon should also be avoided. Most respondents do not understand technical marketing words. For example:

- Do you think the **distribution** of soft drinks is adequate? (**Incorrect**)
- Do you think soft drinks are readily available when you want to buy them? (**Incorrect**)

**Use Unambiguous Words**

Words should have a single meaning that is known to the respondents. A number of words that appear to be unambiguous have different meanings to different people. These include “usually,” “normally,” “frequently,” “often,” “regularly,” “occasionally,” and “sometimes.” Consider the following question:

➤ In a typical month, how often do you shop in general stores?

➤ Never

➤ Occasionally

➤ Sometimes

➤ Often

➤ Regularly **(Incorrect)**

➤ In a typical month, how often do you shop in general stores?

➤ Less than once

➤ 1 or 2 times

➤ 3 or 4 times

➤ More than 4 times **(Correct)**

➤ Researcher should consult a dictionary and thesaurus.

**Avoid Leading or Biasing Questions**

A leading question is one that clues the respondent to what answer is desired or leads the respondent to answer in a certain way, as in the following:

➤ Do you think that patriotic Pakistanis should buy imported automobiles when that would put Pakistani labor out of work?

➤ Yes

➤ No

➤ Don't know **(Incorrect)**

➤ Do you think that Pakistanis should buy imported automobiles?

➤ Yes

➤ No

➤ Don't know **(Correct)**

Bias may also arise when respondents are given clues about the sponsor of the project.

Respondents tend to respond favorably toward the sponsor. The question, “Is Colgate your favorite toothpaste?” is likely to bias the response. A more unbiased way of obtaining this information would be to ask, “What is your favorite toothpaste brand?”

**Avoid Implicit Alternatives**

An alternative that is not explicitly expressed in the opinions is an implicit alternative. Consider the following questions:

➤ Do you like to fly when traveling short distances? **(Incorrect)**

➤ Do you like to fly when traveling short distances, or would you rather drive? **(Correct)**

In the first question, the alternative of driving is only implicit but in the second question it is explicit. The first question is likely to yield a greater preference for flying than the second question.

**Avoid Implicit Assumptions**

Questions should not be worded so that the answer is dependent upon implicit assumptions about what will happen as a consequence. Consider the following example:

- Are you in favor of a balanced budget? **(Incorrect)**
- Are you in favor of a balanced budget if it would result in an increase in the personal income tax? **(Correct)**

Implicit in question 1 are the consequences that will arise as a result of a balanced budget. There might be a cut in defense expenditures, increase in personal income tax, cut in social programs, and so on. Question 2 is a better way to word this question.

### **Avoid Generalizations and Estimates**

Questions should be specific, not general. Moreover, questions should be worded so that the respondent does not have to make generalizations or compute estimates. For example:

- What is the annual per capita expenditure on cosmetics in your household? **(Incorrect)**
- What is the monthly (or weekly) expenditure on cosmetics in your household?

And

- How many members are there who use cosmetics in your household? **(Correct)**
- The researcher can then perform the necessary calculations.

### **Sequencing the Questions**

- After the wording of the questions has been described, their sequence should be established. What should be the flow or order of the questions in the questionnaire.

➤ Although this aspect draws heavily on the skill and experience of the researcher, there are some suggestions for the sequencing of the questions within the questionnaire. These suggestions are presented below.

■ **Use a simple and interesting question in the beginning.** To open the questionnaire, the respondent's interest and curiosity must be captured immediately. This is a good way to establish rapport with the respondents. This also gives confidence to the respondent. For example, if you are conducting a survey on the use of cookbooks, the first question may be "Do you like to cook?"

■ **General questions should be asked first and specific questions later.** Within a given topic, general questions should be followed by specific questions. For example "What considerations are important to you in buying tea" should precede the question "When you are buying tea, is aroma important to you?" Moving from general to specific question is called Funnel Approach.

■ **Uninteresting and hard questions should be placed late in the sequence.** Sequence the embarrassing, sensitive, dull and complex questions well down in the questionnaire. More demanding and personal questions about age, income etc. should be placed at the end so that the respondent feels psychologically comfortable.

- There are three types of information gathered with the help of a questionnaire. These types are:
  - Basic information
  - Identification information
  - Classification information
- Basic information relates directly to research problem.
- Identification information asks name, telephone number and address.
- Classification information is used to classify the respondent in various groups for the purpose of analysis.

As a general rule, the order of these information should be like this: Basic information first, followed by the classification and finally identification information.

- **Logical Order.** The questionnaire should flow smoothly and logically from one topic to the next. Sudden shifts should be avoided as these tend to confuse the respondent and leads to him/her to indecision. When a new topic is introduced, a transition statement should be given to switch the respondent's train of thought properly. Branching questions should be designed carefully. It is

advised that the research questionnaire be divided into several parts for basic information and these parts should be logically arranged.

## LECTURE # 19

### Data collection and fieldwork

#### Covering Letter for Questionnaire

##### Introducing Questionnaire

Introducing questionnaire is an important step in the designing of questionnaire. It is usually given in a covering letter which accompanies the questionnaire. In personal interviews, it may take the form of opening remarks. No matter cover letter or opening remarks, it contains the following points:

- Name of the sponsor/survey team
- Why the survey is being conducted
- How the respondents were selected
- Request for response
- Any incentive provided for participating

As far the name of the sponsor is concerned the survey may be **undisguised** or **disguised**.

- In **undisguised** approach, name of the researcher and sponsor is identified whereas in **disguised** name of the sponsoring company is concealed from the respondents. One reason for disguising the name is that we should not let the competitor know about the survey.
- Another reason for concealing the name of the sponsor is that sometime disclosure of the name of the company might influence the answers of the respondents.
- In the cover letter purpose of the survey should be stated simply and clearly. The statement of purpose may be concise and described in one or two sentences. Statements like “We are conducting a research (survey) or customer perception about banks in Gulberg area” should be good enough.
- In this statement you are even concealing the name of the sponsor
- The respondents should also know how they were selected. Each one is curious “Why me.” Tell the respondents how– may be they were selected at random, may be judgmental or may be by referral (Snowballing)
- Towards the end of the cover letter or opening remarks, the respondents be requested to cooperate and participate in the study by providing necessary data.
- “May I request your good-self to take five minutes to fill in the attached questionnaire and send it back in enclosed postage paid self addressed envelope.”
- In a personal or telephonic interview, it might be like this;
- “May I ask you now a few questions about your experience in University XYZ where you have been educated” or “You are one of the few people selected to express your views on proposed topic. The last section of the cover letter might mention about the incentive, if any, provided to the respondents for participation in the study. Different forms of incentives may be used. Following are some of the examples:
  - Reduce the anxiety of the respondents concerning their privacy. Assure the respondents that their names will be confidential. There will be complete anonymity.
  - Offer a sample of product.
  - Offer to provide a copy of the results of the research.

- Offer monetary incentives. For example Rs. 100 for a completely filled questionnaire.
- Creation of introduction to the research by way of a cover letter requires much careful effort in the development of a questionnaire. An example of the cover letter is given on the next slides.

ABC Research Company

Dear Mr. Ali,

We are conducting a research survey among managers of plastic industries in Pakistan. The basic purpose of the research is to find out the advantages and disadvantages of some new products. Your opinion will enable the plastic manufactures to be aware of the requirements of the plastic users and opinion of the non users. In its turn, it will help them to design the needed products more carefully.

Your name has been selected randomly from a list of plastic industries obtained from the Lahore Chamber of Commerce and Industry.

You are requested to please spare only ten minutes to complete the enclosed questionnaire and return it in the stamped, self addressed envelope attached with the questionnaire. Your answers are very important for our research.

May I assure you that your answers will be kept strictly confidential and anonymous.

If you want to receive a copy of the findings of this research, please indicate so on the designated place on the questionnaire. We will be pleased to send you a copy of the report to you as soon as it is ready.

Please return the questionnaire at the earliest. Thank you very much for your help.

Yours truly,  
Ahmad Nawaz  
Director

Encl: As above

### **Pre-testing the Questionnaire**

- Before the questionnaire can be used in field operations, it should be pre-tested and revised. How the questionnaire will perform under actual conditions can be determined by pre-testing.
- A pretest is use of questionnaire on a trial basis in a small pilot study to determine how well the questionnaire works.
- Questionnaire pre-test is vital. Pre-test for a questionnaire is the same as in the test marketing in new product development.
- There should be at least one pre-test and revision of the questionnaire before it is ready for field operations.

### **Purpose of Pre-testing**

- The main purpose of pre-testing is to improve the questionnaire so that the questions are easily understood. Specifically pre-test assesses the following:
  - Does the questionnaire include precise instructions for the respondents to fill in the questionnaire?
  - Does each question ask for only one bit of information (Double barreled questions)
  - Is the wording of question understandable? Do words create confusion or give double meaning.

- There are no leading and loading questions.
- Does the questionnaire contain technical words or abbreviations which may be unfamiliar?
- Are the questions sufficient to cover all conceivable answers?
- Sequence and flow of questions is adequate.
- General appearance of the questionnaire is appealing and motivating the respondents to cooperate.

### Method of Pre-testing the Questionnaire

The following steps are followed in pre-testing the questionnaire:

- Select 10-15 persons other than the actually sampled units. The pre-test group should include respondents similar to those to be used in actual study.
- These respondents should be informed about the purpose of the pre-test before the pre-test actually starts. They should be requested to cooperate in spotting words, phrases, instructions, question flow and other aspects of the questionnaire which are confusing and difficult to understand or a problem otherwise.
- First use personal interview for pre-test and discover any problem and revise if necessary.
- Then the revised questionnaire be pre-tested in the manner it is to be used ultimately in the final survey i.e. by mail or telephone

Protocol analysis or debriefing procedures may be used in pre-testing. In protocol analysis, the respondents do “loud thinking” while giving answers to the questions. Comments are tape recorded and analyzed later. If debriefing procedure is used then the respondents are told, after completing the questionnaire, that this was merely a pre-test and its objective was to improve the questionnaire. Then they are invited to comment on the questions, sequence, wordings etc. and any other problem that they faced when they were filling the questionnaire.

- Prepare dummy tables from the responses of the pre-test and check if there is any problem in tabulating the information or if some questions are superfluous.
- Revise the questionnaire in the light of the pre-test. Eliminate questions that do not provide adequate information, change wording and sequence if justified. Remove all the problems that were identified during pre-test.
- If there were many changes in the questionnaire, the revised questionnaire should be pre-tested again using a different sample of respondents.

### Pre-coding the Questionnaire

Pre-coding the questionnaire is perhaps the final task in the development of the questionnaire.

- Pre-coding includes placing the codes (numbers) on the questionnaire to facilitate data entry after collection of data. The objective of pre-coding is associating each response with a unique number or letter.
- Number is usually preferred to letter because it is more fast to keystroke the numbers in the computers and computer can process numbers than letters more efficiently.

### Example of Pre-coding the Questionnaire

- Have you purchased Pizza A in the last fifteen days?
  - Yes (1)
  - No (2)
- The last time you bought Pizza A

- Was delivered to your house (1)
- You picked it yourself (2)
- Was delivered in your office (3)
- You ate the pizza at their restaurant. (4)
  
- What is your opinion about the taste of Pizza A?
  - Excellent (1)
  - Good (2)
  - Satisfactory (3)
  - Poor (4)

## ***LECTURE # 20***

### **Data Analysis: Data preparation and data cleaning**

#### **Final Production of Questionnaire**

After pre-testing and pre-coding, the questionnaire should be produced finally. The physical appearance of the questionnaire can affect the response rate and the accuracy of the answers. The following points should be kept in mind in the final production/reproduction of the questionnaire.

- Use good quality paper.
- The questionnaire should have a professional appearance. If the quality of the paper is poor or otherwise appearance is shabby, the respondent may think that the research project is unimportant and quality of the response may not be that good.
- If the questionnaire runs to several pages, it should be in the form of a booklet instead of stapled sheets of paper.
- Questions should be numbered serially. This helps keep the control in field operation. If anonymity is an issue, don't use these numbers.
- Leave reasonable space for open-ended questions. If you leave less space, the answers may be short accordingly.
- If the respondent has to skip a question or section, use "go to."
- Don't spread one question on two pages. Each question should be on one page only.
- Type and font should be large enough to be read clearly.
- Vertical instead of horizontal response columns should be used. It is easier to read down the column rather than sideways.
- Color coding may be used if convenient. Also different colors of questionnaires may be used for different respondent groups.
- The questionnaire should appear as short but not at the expense of overcrowding the questions.
- Instructions and directions to respond to different questions or set of questions should be clear and be placed close to the questions.

#### **Final Checklist for Questionnaire Design**

- Specify what information will be sought
- Review research problem, information needed, research questions and hypotheses.
- Have a clear idea of your respondents.
- Determine the type of interviewing i.e. personal interview, telephonic interview or mailed questionnaire.
- Determine the content of questions.
- Check if the question is necessary.
- How many questions are needed for required information?
- Avoid double barreled questions.
- Make sure each question addresses only one specific issue.
- Is the respondent informed? Use filter questions.
- Can the respondent remember? Use aided recall.
- Is the respondent willing to share information? Provide necessary motivation.
- Avoid threatening questions.

- Does the request for information appear to be legitimate?
- What is the level of effort required from the respondent?
- Is the information required sensitive? If so
- Bring sensitive topics at the end of the questionnaire.
- Use third person technique.
- Use counter biasing statement.
- Determine response Format/Structure
- Which structure of the question is appropriate? Open ended, structured, multiple choice, dichotomous?
- In exploratory research, use open-ended questions.
- Whenever possible, use structured questions.
- In multiple choice questions, use all possible choices.
- Clearly indicate, if the items are to be ranked or only one item is to be selected.
- In dichotomous questions, include a neutral choice, if you think there will be many neutral opinions.
- Determine the wording of the questions.
- Use simple language and words.
- Avoid ambiguous wording like frequently, often etc.
- Avoid leading questions.
- Avoid loading questions.
- Avoid implicit assumptions.
- Avoid implicit alternatives.
- Use positive and negative statements.
- Don't make the respondent compute a lot.
- Determine the sequence of questions.
- Use a simple non-threatening open ended question in the beginning.
- Use the funnel approach for asking broad questions and then narrowing them down.
- Ask sensitive or hard questions late in the questionnaire.
- Follow chronological order when collecting historical data.
- Ask filter questions if needed.
- Questions about one topic be completed before moving to the next topic.
- Use logical order in sequencing wherever possible.
- Determine physical characteristics of questionnaire.
- Make sure that questionnaire has a professional appearance.
- Start with introduction to questionnaire. (Separate introductory letter if appropriate)
- Quality of the print and paper should be good.
- Try to make questionnaire short but not at the cost of overcrowded appearance.
- If questionnaire has many pages, use a booklet form.
- List the name of the organization on the first page of the questionnaire unless you feel to disguise the name due to some genuine reasons.
- Questions should be numbered.
- Pre-code answers for easy processing in computer.
- Use "go to" if the respondent should skip some questions.
- Number the questionnaire in serial order.
- Use vertical response columns.
- Directions or instructions should be clear and placed as close to the questions as possible.
- Pre-test and revise the questionnaire.

- Do at least one pre-testing. If time permits, pre-tests may be two or more.
- Pre-test the questionnaire first by personal interview then by the method that is to be used ultimately.
- Pre-test all aspects of questionnaire i.e. content, wording, form, sequence, difficulty level etc.
- Pre-test sample may be small (15-30) for initial testing.
- You may use protocol and debriefing procedures for the identification of problems in the questionnaire.
- The pre-test sample should be drawn from the same population from which the ultimate sample has been drawn.
- Prepare dummy tables and analyze the data.
- Make revisions if necessary.
- If more than one pre-test, each should be done on different sample of respondents.

## *LECTURE # 21*

### Data Analysis: Data preparation and data cleaning...contd

#### Observation Form

It is easier to design an observational form than a questionnaire as question asking process is eliminated. Also there is an issue of controlling non-sampling error. Still there are certain important issues in the development of an observation form.

The researcher should be clear about the types of observations to be made and how these should be measured. The measurement may involve only a form, a mechanical or electronic recording device (video for example) or both.

An observational form usually specifies the following items in detail.

- **Who to be observed?** Purchaser, browser, males, females, couples, children, anyone entering the store.
- **What to be observed?** Brands purchased, brands asked first, quantity purchased, inquiries, influence of friends/children, price inspected on the package
- **When to observe?** Weekdays, weekends, day, date, hour of purchase.
- **Where to observe?** Type of store, in the store, at the checkout counter, department within the store.
- **Why to observe?** Family purchase pattern, size of the package, influence of price, influence of brand name.
- **Way to observe.** Participant observer, undisguised observer, hidden camera.

Observational forms should be simple to use. The form should permit the observer to record the behavior in detail rather than summarizing it. Finally the observational forms needs pre-testing as in the case of questionnaire.

➤ Presented below is a portion of an observational form to evaluate service provided by bank employees.

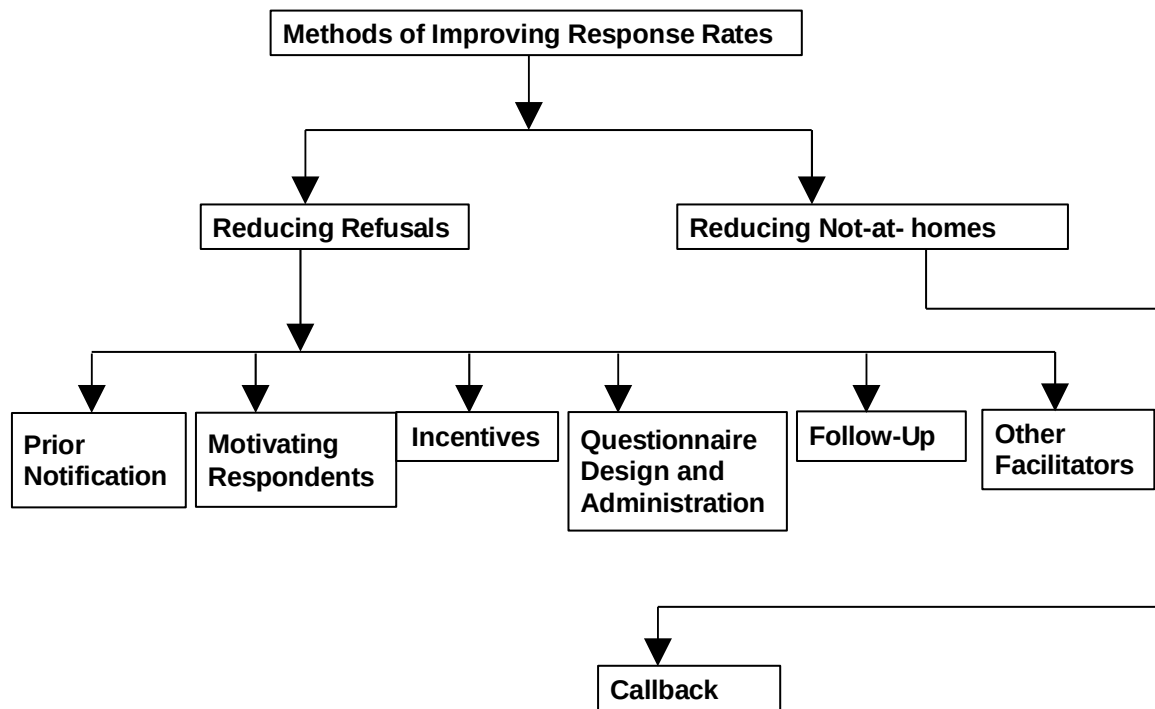
#### Customer Relation Skills

|                                             | Yes                      | No                       | Does not apply           |
|---------------------------------------------|--------------------------|--------------------------|--------------------------|
| ■ Employee noticed and greeted immediately. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Employee speaks pleasantly and smiles.    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Employee found your name promptly.        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Employee asked you to be seated.          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Employee's desk area was clean.           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ■ Employee was helpful.                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

#### Non Response Issue in Data Collection

➤ Non-response error arises when some of the potential respondents included in the sample do not respond. This is one of the most significant problems in survey research. For a given study, if the non-respondents differ from the respondents on the characteristics of interest, the sample estimates will be seriously biased. Higher response rates, in general, imply lower rate of non-response bias. Response rates themselves do not indicate whether the respondents are representative of the original sample. Because low response rates increase the probability of non-response bias, an attempt should always be made to improve the response rate.

## Improving the Response Rates



### Refusals

➤ Refusals result from the unwillingness or inability of people included in the sample to participate.

### Reducing Refusals

➤ **Prior Notification:** In prior notification, potential respondents are sent a letter notifying them of the imminent mail, telephone, personal, or internet survey. Prior notification increases response rates for samples because it reduces surprise and uncertainty and creates a more cooperative atmosphere.

➤ **Motivating the Respondents:** Motivated to participate in the survey by increasing their interest and involvement. In the foot-in-the-door strategy, the interviewer starts with a relatively small request, such as “Will you please take five minutes to answer five questions?”, to which a large majority of people will comply. The small request is followed by a large request, the critical request that solicits participants in the survey or experiment. The rationale is that compliance with an initial request should increase the chances of compliance with the subsequent request. The door-in-the-face is the reverse strategy. Foot-in-the-door is more effective than door-in-the-face.

➤ **Follow-up:** Contacting the non-respondents periodically is effective in decreasing refusals in mail surveys. Two or three mailings are needed, in addition to the original one. Follow-ups can also be done by telephone, e-mail or personal contacts.

➤ **Other Facilitators:** Personalization, or sending letters addressed to specific individuals, is effective in increasing response rates.

➤ Besides above following are some of the strategies for improving response rates:

- Maximize the effectiveness of follow-up calls.
- Make materials more appealing and easier to complete.
- Improve survey participant rewards.

- Optimize the arrival of respondent materials.
  - **Incentives:** Offering monetary as well as non-monetary incentives to potential respondents prepaid or promised. The prepaid incentive is included with the survey or questionnaire. The promised incentive is sent to only those respondents who complete the survey. Non-monetary incentives are premiums and rewards such as pens, pencils, books and offers of survey results. Prepaid incentives have been shown to increase response rates to a greater extent than promised incentives. The amount of incentive has a positive relationship with response rate, but the cost of large monetary incentives may outweigh the value of additional information obtained.
  - **Questionnaire design and administration:** A well designed questionnaire can decrease the overall refusal rate as well as refusals to specific questions. Likewise the skill used to administer the questionnaire in telephone and personal interviews can increase the response rate. They do not accept a “no” response without an additional plea.
- Not at Homes:** The percentage of not at homes can be substantially reduced by employing a series of callbacks, or periodic follow-up attempts to contact non-respondents.

## LECTURE # 22

### Descriptive and inferential statistics

#### Research Proposal

A research proposal is written document that presents a plan for a project and its purpose is to convince the client that the researcher is capable of successfully conducting the proposed research project. It is a planned document that serves as a road map for the researcher.

It shows the researcher's ability and competence for successfully conducting the proposed research project.

A good research proposal helps in getting contract

As such a research proposal is a selling technique as well i.e. for professional researchers, it is a persuasive technique for selling their services.

It is a document which is written before the research project begins.

As the research proposal is an instrument for good planning, it requires maturity to prepare a good research proposal.

It shows the researcher's competence for successfully conducting the research project.

For professional researchers, it is a persuasive technique for selling their services.

#### Parts of a Research Proposal

■ On the top, write the research topic.

■ Before the detailed proposal, an executive summary/overview or abstract may be given stating briefly what is given in the proposal. This is the part which the busy executives will read.

■ Regular proposal is started with introduction/ background. Before writing the research proposal, the researcher should meet with the manager to understand:

- What is the background to the research?
- What is the context in terms of management problem?
- What is the environment?
- This part shows the understanding of researcher about problem.

**Define the Problem:** Researcher extracts the research problem from the introduction part. Research problem is defined in one or two sentences. This part describes the main purpose of the research.

It also describes the scope and limits of the research.

5. Research Objectives: Specific objectives or information needs must be specified clearly and concisely. These objectives should be SMART (specific, measurable, achievable, realistic and timely).

**6. Literature Review:** A brief review of the related literature be give in this section referencing all the books/journals/websites/newspapers etc. Review of literature helps in developing:

- **Theoretical framework/ models**
- **Hypothesis**
- **Questionnaire**

**7. State Research Design:** In this section describe the research design that the researcher would adopt for the project, whether descriptive, causal or exploratory should be described in detail. Research design should contain a description of research methodology which will contain the following.

## **2. Nature of Data:**

The data is either primary or secondary

## **3. Sources of Data:**

- Primary data sources include people, stores, brands, customers, managers etc.
- Secondary data sources include books, government reports, UNO reports, Islamic conference reports, ministry of agriculture, ministry of industry or independent researchers, consultants or syndicated data. Secondary data sources may be internal and external both.
- Provide the list of sources in research methodology.

## **4. Define the Population and Sample Size in Research Design:**

- Population is the aggregate of all the units which have the data for the research.
- Indicate the size of the sample and the sampling techniques for selecting the sample.
- Instrument of Data Collection: Researcher should define in the research design which instrument he/ she will use for data collection in proposed research project. Data collection instrument includes questionnaire, observation form, or experimentation etc.
- In case of causal research, the researcher is required to define the control and experimental group.

Field Work: In this section the description of fieldwork activities is given. This includes

- How the data will be collected
- Personnel
- How many people/ field force will be required
- How they will be recruited
- How they will be trained, motivated
- How they will be supervised
- How the quality of research will be controlled.
- Researcher also specifies what will be the control mechanism to ensure the quality of data collection. Supervision of field force is very important and researcher should exert his/ her best effort to maintain the quality of research.

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## ***Lecture#23***

### **Descriptive and inferential statistics...contd**

#### **Research Proposal...continued**

We are continuing with the parts of research proposal. In the previous lecture we have covered 8 parts of the research proposal namely, title, executive summary, background, research problem, specific research objectives, literature review, research design, fieldwork. Now we will describe the remaining parts of the research proposal. After field work has been explained, the next part is data analysis.

9. Data Analysis: In this section, method of data analysis is given. What kind of statistics will be used whether cross tabulation, univariate analysis, bivariate or multivariate analysis will be done. How the results will be interpreted. Any software will be used or not.

10. Report: How the report will be prepared. What will be the tentative outline and when will it be submitted. Whether any oral presentation will be given or no, if so when.

11. Budget: A carefully prepared budget is shown in the research proposal. The cost items should be worked meticulously. If this budget is more than reasonable, we may lose the bid and if less we may suffer loss. Therefore we should be careful while making the budget.

12. Time Scale: A time table of research activities be given for the research project. A Gantt chart be prepared which will graphically show the beginning and ending of each research activity like development of questionnaire, collection, data analysis, report writing etc. This will give a snapshot of the entire work of the project. Alternatively the activities may be listed and period required for the completion of this activity may be listed in front of it, and then totaling the entire period for the completion of the project.

13. Appendices: After the main text of the research proposal as described above, some other material may be added as appendixes to impress the client. This might include the list of the research work done previously, reference letters from the companies for whom you have already completed some research projects, bio-data of the personnel that will be working on this project etc.

A research proposal has a formal format and includes prefatory parts like title, title page, table of content etc. in addition to the regular textual parts as explained above.

Given below is Time Scale for a project in the form of a Gantt chart. This is followed by a time scale by the activities listed in the outline form.

| Sr # |                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
|------|-------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
|      | Week number                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|      | ACTIVITY                            |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 1    | Discussing with the client          |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 2    | Read Literature                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 3    | Develop questionnaire               |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 4    | Pilot test and revise questionnaire |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 5    | Administer questionnaire            |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 6    | Enter data into computer            |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 7    | Analyze data                        |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 8    | Prepare draft report                |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 9    | Revise draft, format for submission |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 10   | Give oral presentation              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| 11   | Print, bind and submit              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |

| <b>Sr. #</b> | <b>Task to be achieved</b>          | <b># of weeks</b> |
|--------------|-------------------------------------|-------------------|
| 1            | Discussing with the client          | 1                 |
| 2            | Read Literature                     | 1                 |
| 3            | Develop questionnaire               | 1                 |
| 4            | Pilot test and revise questionnaire | 1                 |
| 5            | Administer questionnaire            | 3                 |
| 6            | Enter data into computer            | 1                 |
| 7            | Analyze data                        | 2                 |
| 8            | Prepare draft report                | 3                 |
| 9            | Revise draft, format for submission | 1                 |
| 10           | Give oral presentation              | 1                 |
| 11           | Print, bind and submit              | 1                 |
|              | <b>Total weeks</b>                  | <b>16</b>         |

## ***Lecture#24***

### **Data analysis**

#### **Fieldwork**

Fieldwork is an important step in the research process. If it is poorly managed all previous steps will be neutralized. Fieldwork is equated to data collection and other related activities; e.g. contact with respondents administer instrument, record data, return data to central location for processing. Collection of data may be by telephonic, face to face, or mail. So we should first see what method of data collection will be used and then accordingly design of field including activities of supervision, monitoring, mailing, observing all field operations etc. If field work is not properly organized, it will result into many kinds of errors. There are four main aspect of fieldwork which are as follow:

- Time schedule
- Budget
- Personnel
- Performance measurement

#### **Time Schedule**

When we are preparing a time schedule of our activities, we must be realistic. We should allocate reasonable amount of time to data collection within the total time budget to make a time schedule, the planner should

- Specify beginning and ending of the project
- Sequence activities within time frame
- Days needed to complete various activities
- Prepare a Gantt chart

#### **Budget**

Budget includes assignment of cost to various activities identified in time schedule. Both the time schedule and budget are prepared together. Budget shows detailed breakdown of the cost of all activities and some amount for unseen contingencies. It is reviewed and approved by some individuals in the organization.

Various cost items of cost include:

- Wages and salaries
- Telephone expenses

- Material and supplies
- Salaries of field supervisor/s.
- Reproduction expenses like photocopy etc.
- Miscellaneous

## Personnel

Personnel mean human resources for the fieldwork. These are collectively called field force. Management of personnel requires selection, training, supervising, authenticating and evaluation of field workers.

For selection, we have to develop Job Description and Job Specification. What should be the characteristics of the field force?

- Should be healthy and have stamina to undertake strenuous work.
- Should have a pleasant appearance.
- Be communicative, listening and possess speaking skills.
- Educated up to BA
- Preferably should have some experience. Inexperienced personnel result into excessive coding error, misreporting, and larger refusal rate

## Training of Field Force

After the personnel have been recruited, these should be trained in the skills of data collection. Training is critical for fieldworkers. It should be given in person at some central location.

### It should cover the following:

- Initial contact, appointments, opening remarks to seek permission and cooperation
- Give training about the observation also
- Asking questions, it brings high dividends in eliminating potential bias.
  
- Be thoroughly familiar with the questionnaire
- Observe order of the questions
- Use exact wording
- Slow reading will help understand the question by the respondents.
- Repeat questions, if not understood
- Probe carefully

## Probing Questions

Probing questions are used to motivate, clarify, enlarge, or explain the answers. Techniques include the following:

- Repeat the question in the same words
- Repeat reply verbatim and confirm.
- Silent probe by unexpected pause and looks but should not be not embarrassing
- Reassure and boost the respondent that there is no right or wrong, just what it means to him/her.
- Elicit clarification, by saying “I don’t quite understand”, “please tell me more”, “what do you mean”, “anything else”, “any other reason?”

### **Recording Replies**

- Seems simple but mistakes are common
- Record unstructured question verbatim

#### **Guidelines for recording are:**

- Record identification data like name, date, interviewer, project in the beginning.
- Record during the interview and not afterward
- Record in respondents’ own words
- Do not summarize
- Include everything
- Include all probe comments
- Repeat the response so that respondent listens and verifies.

### **Terminating Interview**

#### **Guidelines for closing the interview are:**

- Don’t close before all information is gathered
- Leave the respondent with good feelings
- Express your appreciation for his time and cooperation

#### **In telephonic interview**

- Verify the telephone number once again
- Courteous and polite
- Put a smile in your voice
- Speak clearly
- Don’t sound bored
- Close interview properly

## ***Lecture#25***

### **Data analysis**

#### **Performance Measurement of the Field Force**

Performance measurement and management are two important aspects of field work. Supervisor should ensure that the procedures are being followed. If not, give additional training to the field workers. Some guidelines are:

- Collected questioners be examined and edited
- Ensure sampling plan being followed strictly not on convenience & accessibility
- Cheating and fake answers be controlled by calling the respondents on phone. However, sometimes this thing is difficult to control.

#### **Authentication & Evaluation**

A good method to authenticate that the data were collected genuinely, call 10 to 15% of respondents to validate. Ask their basic demographic data & cross check. You also ask about length, quality, and their reaction to interviewer from the respondents

In order to evaluate the performance, check in each of the field worker:

- Contact rate
- Response rates
- Refusal rate
- Cost incurred and time spent
- Quality of interviewing including precision, ability to probe, ability to ask sensitive question, interpersonal skills and termination of interview
- Quality of data: legibility, non response, instruction followed or not, answers completely recorded or not.

#### **Data Preparation**

We should understand that data is recorded measures of phenomenon but information is body of facts in a format suitable for decision making. The purpose of research is to provide information.

Data analysis is a process whereby data re converted into information. There are many methods and techniques of data analysis.

Understanding principles of data analysis is important because it

- m. Leads the researcher to develop insight into information and data
- n. Helps avoid erroneous judgment and conclusions.
- o. Helps interpret the analysis of others.

Knowledge and power of data analysis can constructively influence research design but it should be remembered that it cannot rescue or compensate study not well conceived. If research hypotheses were non viable or uninteresting, or questions asked were irrelevant, or sampling was inadequate or if fieldwork was sloppy, data analysis will not provide any remedy for these deficiencies. On the other hand, selecting inappropriate data analysis techniques has the potential to ruin a well designed study. It will bring unclear, incomplete and erroneous conclusions; which in their turn will lead to inferior decisions.

We can avoid these pitfalls only by having an adequate understanding about techniques of data analysis.

### **Data Editing**

Although data analysis techniques are unique for each study but all studies require data editing. Data editing mean identifying omissions, ambiguities, and errors in the responses and taking necessary corrective actions.

Who is responsible for such errors or omissions, could be all or any of the interviewer, supervisor, or data analyst.

Problems that have been identified through various studies and need to be fixed during editing of data include but not limited to the following:

- Incorrect instructions by the interviewer;
- Omissions, ambiguities (two boxes checked in MCQ);
- Inconsistencies (not married but children);
- Lack of cooperation (all agree),
- Ineligible respondents (age under 18)

There are several alternatives for data editing. Some possibilities are:

- Approach the respondent again for clarification;
- Devise a new category;
- Create a category of “no answer” or “missing”; or
- Don’t include a question or the whole questionnaire in your analysis.

## Non Sampling Errors

### Sampling and Non Sampling Errors

All errors in survey except sampling plan and sampling size are non sampling errors. These include:

- Non response errors;
- Data gathering errors;
- Data handling errors;
- Data analysis errors;
- Interpretation errors;
- Ambiguity in problem definition;
- Inappropriate wording of questions etc

Greatest potential for these errors is at data collection stage or field work.

Such error may occur due to fieldworker or respondents.

### Fieldworker Errors

These errors are committed by the person who administers the questionnaire or takes interview. The errors may be intentional (committed deliberately) or unintentional (occur without willful intent). Examples of each are listed below.

#### *Intentional Fieldworker Errors:*

- Cheating i.e. intentionally falsifying responses due to compensation e.g. if Rs. 500 per completed interview are being paid to the interviewer, he/she may inflate the number of interviews complete to get more money.
- Convenient interviewee may be contacted instead of a genuine sample.
- Less than agreed questionnaires may be completed without cheating.
- Lead the respondent to a particular answer through wording, voice inflection, or body language.
- Re-wording the question. (Isn't it?)
- Subtle influence on the respondent by shaking the head to yes or no, or saying uhu, okay etc.

### **Unintentional Fieldworker Errors:**

Three sources

- Personal characteristics, accent, gender
- Interviewer's misunderstanding of instruction about scales, recording responses etc.
- Gap between the educational level of research designer and the fieldworker. It creates communication gap.
- Miscellaneous sources like fatigue, monotony, at the end less alert, fail to check the reply, does not follow skip-pattern, or hurry.

### **Respondent Errors**

These errors are committed by the person who fills the questionnaire or responds to interview. Like fieldworker errors, respondent errors are intentional or unintentional. See examples below.

#### **Respondents' intentional Errors:**

Unfortunately respondents willfully misrepresent themselves in two ways

- Tell a lie due to privacy or embarrassments e.g. income, marital status for lonely women, age etc.
- Don't give response in whole or part due to busy schedule or privacy.

#### **Respondents' unintentional Errors:**

Respondents unintentionally believe that an invalid response is a truth. Some instances are:

- Answering without an understanding whether income is with or without taxes
- Checking two answers instead of one
- Guessing, uncertain of accuracy, little knowledge, low recall but feel compelled to answer.  
Electricity consumption in K/hr
- Attention Loss, not interested in survey
- Distraction, interruption, off track

- Acquaintance on mail, Toddler in telephone survey, telephone in mail survey
- Respondent Fatigue, Cause no opinion.

### How to Control Field Errors

Precautions should be taken to minimize such errors, but these cannot be eliminated. Potential for these errors always exists in field activities. What are the controls for these errors? Some methods have been suggested for controlling field errors. These are described below.

Intentional fieldwork errors can be controlled by adopting these methods:

- **Supervision:** Oversee the work. Central telephone monitoring can be used for this. Spot cheating. Reprimand the interviewer if needed. It is always good to inform the field workers about monitoring so that they remain alert. In the beginning accompany the personnel to ensure that field workers have been adequately trained.
- **Validation:** Validate the work by re-contacting about 10% respondents. Sometimes re-administer the instrument for comparison.

*Unintentional fieldworker errors can be controlled by three mechanisms.*

9. Selection and training can take best care of such errors.
10. Orientation session: Meeting of field workers with the supervisor. He/she gives instructions and tells about requirements of the questionnaire administration.
11. Role Playing (Rehearsals): Supervisor or somebody plays the role of respondent and checks the interviewing skill. Alternating of the roles may take place between two field workers.

### Control of Intentional Respondent Errors

*Minimize falsehood and non response errors by following these tactics:*

- **Anonymity:** assure confidentiality of respondent's name
- **Incentives:** Give or promise gifts like t-shirts, ballpoints, cash, diaries etc.
- **Validation Checks:** confirm the response by cross checking with other ways, for example see the effect of medicine for baldness.
- **Third Person Techniques:** Design of question in such a way that it does not seem to be a direct personal question rather indirect in the name of a friend, colleagues or neighbors.

### Control of Unintentional Respondent Errors

Unintentional errors on the part of respondents can be controlled by adopting these techniques.

- 1. Well Drafted Questionnaire:** Clear instructions and examples remove misunderstandings and confusions.
- 2. Reversal of Scale on Endpoints:** Negative adjectives may be placed not on one side. If you place these adjectives sometimes on right and sometimes on left side, it will compel the respondent to think and give thoughtful answer.
- 3. Prompters:** Keep respondents on task. Give written or oral statements like “this was the most difficult section to answer”, “we are almost finished” This reduces the fatigue also.

In the end we can say that there are different errors and different control but good design of questionnaire and technology can reduce the errors of data collection in general.

## ***Lecture#26***

### **Data Analysis**

Once the data have been collected and checked for legibility, completeness, consistency, accuracy and response classification, we can proceed with data analysis. Data analysis is one of the many activities of marketing research. It is not the most important aspect of research rather it is as important as other aspects of research e.g. good problem definition, appropriate study design, proper sampling procedures, well designed and tested instruments of data collection, well monitored fieldwork etc.

In data analysis research is concerned with the adequate knowledge of analysis techniques and subsequently selecting the techniques which are in his/her objectives of research.

Statistical techniques fall in two categories:

- g. Descriptive statistics
- h. Inferential statistics

Descriptive statistics techniques describe the characteristics of the sample under study whereas inferential statistics help the researcher make inferences about the population from which the sample was drawn. Selection of statistical techniques also depends on how many variables are to be analyzed at the same time. Accordingly there is uni-variable, bi-variable and multi-variable analysis. Another relevant question while selecting the analysis technique is what level of measurement is available i.e. nominal, ordinal, interval etc.

In data analysis, some basic data analysis techniques and some advance or sophisticated techniques are discussed. We hope that these statistical techniques have been learnt by you in statistical course.

#### ***Basic Data Analysis***

Among others, three basic data analysis procedures, frequency distribution, cross-tabulation and hypothesis testing are discussed here.

#### ***Frequency Distribution***

A frequency distribution simply reports the number of responses that each question received. When a market researcher is finding an answer to the questions about single variable, he/she starts with frequency distribution. Examples of such questions may be:

- e) How many customers are familiar with our new product?
- f) What is the level of income of our brand user: low, medium or high?
- g) How many brand loyal customers do we have?
- h) What is number of heavy, medium and light user of our product?

The number and percentages for the value may be the subject of frequency distribution.

#### ***Examples***

1. Distribution of customer of brand X of the 1300cc Car province wise. (n=780)

Absolute frequency

Relative frequency (%age)

|             |            |             |
|-------------|------------|-------------|
| Islamabad   | 034        | 04.4        |
| Punjab      | 305        | 39.1        |
| Sindh       | 230        | 29.5        |
| NWFP        | 148        | 19.0        |
| Baluchistan | <u>063</u> | <u>08.0</u> |
|             | <u>780</u> | <u>100</u>  |

## 2. Factors important in purchase of Refrigerator. (n=300)

| <u>Attribute</u>                | <u>Frequency</u> | <u>Percentage</u> |
|---------------------------------|------------------|-------------------|
| Size                            | 183              | 61                |
| Color, appearance               | 90               | 30                |
| Price                           | 57               | 19                |
| Less consumption of electricity | 90               | 30                |
| Size of freezer                 | 54               | 18                |
| Self defrosting                 | 60               | 20                |
| Ice maker, Water dispenser      | 84               | 28                |
| Brand name                      | <u>51</u>        | 17                |
|                                 | <u>300</u>       | -                 |

## 3. Monthly income of respondents. (n=200)

| <u>Monthly Income (Rs.)</u> | <u># of Respondents</u> | <u>%ages</u> |
|-----------------------------|-------------------------|--------------|
| 0-5000                      | 15                      | 7.5          |
| 5000-8000                   | 22                      | 11.0         |
| 8000-11000                  | 42                      | 21.0         |
| 11000-14000                 | 60                      | 30.0         |
| 14000-17000                 | 33                      | 16.5         |
| 17000-20000                 | <u>28</u>               | <u>14.0</u>  |
|                             | <u>200</u>              | <u>100</u>   |

## Mean

Mean is a measure of central tendency. There are different kinds of means e.g. arithmetic mean, geometric mean, harmonic mean etc. In marketing research, arithmetic mean which is arithmetic average is most widely used. It is the ratio between the sum of observation and number of observations.

Mean is the sum of values divided by the sample size or number of observations.

## Example

In a sample of 10 household consumers, the household income is shown below:

| <u>Family #</u> | <u>Monthly Income ('000' rupees)</u> |
|-----------------|--------------------------------------|
| 7. 41           |                                      |
| 8. 37           |                                      |
| 9. 28           |                                      |
| 10. 51          |                                      |
| 11. 50          |                                      |
| 12. 36          |                                      |
| 13. 30          |                                      |
| 14. 41          |                                      |
| 15. 47          |                                      |
| 16. <u>29</u>   |                                      |

390

Mean Income (390/10) is 39 Or rupees 39000.

If the data are interval grouped into categories and clauses, mean is calculated by taking the midpoints of the categories. The midpoint of category is multiplied by a frequency in the category summing up the multiplied values and dividing it by sum of frequencies.

Let us see the monthly income of respondents once again

### Monthly income of respondents (n=200)

| <u>Monthly Income (Rs.)</u> | <u># of Respondents (f)</u> | <u>mid Point(x)</u> | <u>fx</u>      |
|-----------------------------|-----------------------------|---------------------|----------------|
| 0-5000                      | 15                          | 2500                | 37500          |
| 5000-8000                   | 22                          | 6500                | 143000         |
| 8000-11000                  | 42                          | 9500                | 399000         |
| 11000-14000                 | 60                          | 12500               | 750000         |
| 14000-17000                 | 33                          | 15500               | 511500         |
| 17000-20000                 | <u>28</u>                   | 18500               | <u>518000</u>  |
|                             | <u>200</u>                  |                     | <u>2359000</u> |

Mean income (2359000/200) is rupees11795.

### Ordinal Data

In ordinal data median is the measure of central tendency. Median is the midpoint of the frequencies. As per this measure 50% of the observations are above median value whereas 50% are below.

If the numbers of observations are odd, the middle observation is the median.

### Example

The values of sales looked by a salesman in a month are Rs. 125000, Rs. 175000, Rs. 325000, Rs. 77000, Rs. 180000.

Arrange them in ascending order i.e.

Rs. 325000

Rs. 180000

Rs. 175000 ←

Rs. 125000

Rs. 77000

The median or middle value is Rs. 175000.

If the observations are even numbers, the median would be the arithmetic mean would be the middle most two values.

### Example

A salesman looked at the sales order worth the following values in a month; Rs. 25000, Rs. 178000, Rs. 510000, Rs. 450000, Rs. 275000, Rs. 370000. Find the median of the data.

Arrange values in descending order.

Rs. 510000

Rs. 450000

Rs. 370000 ←

Rs. 275000 ←

Rs. 250000

Rs. 178000

In the above example middle most two values are Rs 370000 and 275000. As such the median value is arithmetic mean of the above two. i.e.

$$= (370000 + 275000) / 2$$

$$= 645000 / 2$$

$$= \text{Rs. } 322500$$

### Mode

Mode is still another measure of central tendency. This is the observation (x) where the frequency is maximum.

### Example

Following were the number of sales returns according to the models of the product sold.

Model #            1, 2, 3, 4, 5, 6, 7

# of returns      6, 12, 8, 2, 1, 7, 2

The mode of sales return is in the model#2 as the numbers of returns were 12

## ***Lecture#27***

### **Data analysis**

#### **Measure of Dispersion**

■ **Measure of location, mean, mode and median**; describe one characteristics of data i.e. **Central tendency**. However in market research we wish to know about another characteristic of data that is the variation or scatter among the values. One can easily visualize two variables having identical central tendencies but with very different spread.

#### **For example**

If spending of two groups of households on purchasing of tea per annum appears like this:

| <b>Members</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |
|----------------|----------|----------|----------|----------|----------|
| <b>Group A</b> | 3000     | 1500     | 2100     | 1800     | 2800     |
| <b>Group B</b> | 3600     | 972      | 1319     | 2700     | 2609     |

Mean of both is Rs. 2240 but variation of between two groups is not same. This information is important for a tea manufacturer for making his distribution plan.

There are different measures of dispersion which are described below.

**Range:** The range is the difference between the largest and smallest values in the data.

In the previous example, the range of data in **Group A** is

$$\text{Rs. } 3000 - 1500 = 1500.$$

While the range of **Group B** is

$$\text{Rs. } 3600 - 972 = 2628.$$

#### **Standard Deviation and Variance**

The distance between the mean and an observed value is deviation from the mean. When we

square these deviations and find out the mean of these squared deviation, this is called **variance**.

When the different data are **scattered** to a great extent variance is **large**, but if data are **clustered** around the mean, variance is **small**.

### Sample Variance

It is found with the following formula.

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$$

The sum of square deviations for the value from the mean  $\bar{x}$  divided by  $n - 1$ .

### Standard Deviation of Sample

Standard deviation of sample “s” is the square root of the sample variance. To put it in the formula, it would be

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

### Example

■ ABC Real Estate in Karachi wants to know how long does it take to the listed homes to sell. The Director of the firm took a sample of 10 homes listed last year and the number of weeks each house took to be sold. The data revealed that the sample homes took following weeks (rounded to the nearest whole week) **21,6,9,23,1,10,8,11,5,7**.

What was the mean and standard deviation of the time period to sell the homes listed in ABC Real Estate last year?

| Home | Period x | $(x - \bar{x})$ | $(x - \bar{x})^2$ |
|------|----------|-----------------|-------------------|
| 1    | 21       | 10.9            | 118.81            |
| 2    | 6        | -4.1            | 16.81             |
| 3    | 9        | -1.1            | 1.21              |
| 4    | 23       | 12.9            | 166.41            |
| 5    | 1        | -9.1            | 82.81             |

|        |                             |      |                  |
|--------|-----------------------------|------|------------------|
| 6      | 10                          | -0.1 | .01              |
| 7      | 8                           | -2.1 | 4.41             |
| 8      | 11                          | 0.9  | 0.81             |
| 8      | 5                           | -5.1 | 26.01            |
| 10     | 7                           | -3.1 | 9.61             |
| n = 10 | $\bar{x} = 101/10$<br>=10.1 |      | $\Sigma = 426.9$ |

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

$$s = \sqrt{\frac{426.9}{9}}$$

$$= 6.89 \text{ weeks}$$

### Rules of Standard Deviation

- 68% of population fall within  $\pm 1$  standard deviation.
- 95% of the population fall between  $\pm 2$  standard deviations and
- 99.7% or virtually all population fall between  $\pm 3$  standard deviation.

### Example

Let us take another example to illustrate the concepts.

A bank branch located in the heart of the city developed a process to serve the customers during lunch hour (from 1:00 to 2:00 p.m.). The waiting time of the customers (the time customer entered in the bank to when his transaction was completed) was noted in minutes during the lunch hour for a week. A random sample of 12 customers was selected and the waiting time of these individuals was recorded as follows.

4,5,3,5,6,2,7,2,4,3,2

**Compute the arithmetic mean, median, mode, variance and standard deviation.**

A customer walks into the branch and asks the managers how long he is expected to wait. The manager replies “Almost certainly not more than six minutes.” What do you say about the accuracy of this statement?

### Solution

| Customer # | Waiting time x                    | $(x - \bar{x})$ | $(x - \bar{x})^2$ |
|------------|-----------------------------------|-----------------|-------------------|
| 1          | 4                                 | 0               | 0                 |
| 2          | 5                                 | 1               | 1                 |
| 3          | 3                                 | -1              | 1                 |
| 4          | 5                                 | 1               | 1                 |
| 5          | 5                                 | 1               | 1                 |
| 6          | 6                                 | 2               | 4                 |
| 7          | 2                                 | -2              | 4                 |
| 8          | 7                                 | 3               | 9                 |
| 8          | 2                                 | -2              | 4                 |
| 10         | 4                                 | 0               | 0                 |
| 11         | 3                                 | -1              | 1                 |
| 12         | 2                                 | -2              | 4                 |
| n = 12     | $\frac{=48}{12}$<br>$\bar{x} = 4$ |                 | $\Sigma = 1.82$   |

- **Mean** = 4 minute
- **Variance** = 3.312
- **s** = 1.82
- **Median:** Arrange in descending order  
7,6,5,5,5,4,4,3,3,2,2,2
- **Median** =  $4 + 4 / 2 = 4$
- **Mode** = 5

Statement of the manager is correct because the range of  $\pm$  one standard deviation is (4-1.82) (4+1.82).

Majority of the people take not more than **5.82 min.**

### Coefficient of Variation

- Coefficient of variation (CV) is the ratio of the standard deviation to mean expressed in following formula.

$$CV = \frac{S}{\bar{X}} \times 100$$

**CV is expressed in percentage and is useful when the variable is measured on a ratio scale.**

CV is a useful measure of relative dispersion when means are positive. It compares the sets of numbers with different magnitudes.

**Example:**

The standard deviation of closing prices of two shares X and Y were Rs. 5 and 50 and mean closing prices during a week were Rs. 10 and 1000 respectively. In which share should we invest?

**Solution**

If we look at only the standard deviation we might decide to invest in share X because it has less volatility. But when we look at the mean prices and work out the ratio of standard deviation to mean i.e. Coefficient of Variation, the picture is different,

$$CV_x = \frac{5}{10} \times 100 = 50\%$$
$$CV_y = \frac{50}{1000} \times 100 = 5\%$$

Now we will change the decision in favor of Y as fluctuation in Y's prices is much lesser than share X. So coefficient of variation is a good measure of comparing the riskiness in this case.

## ***Lecture#28***

### **Data analysis**

#### **Charts and Graphs**

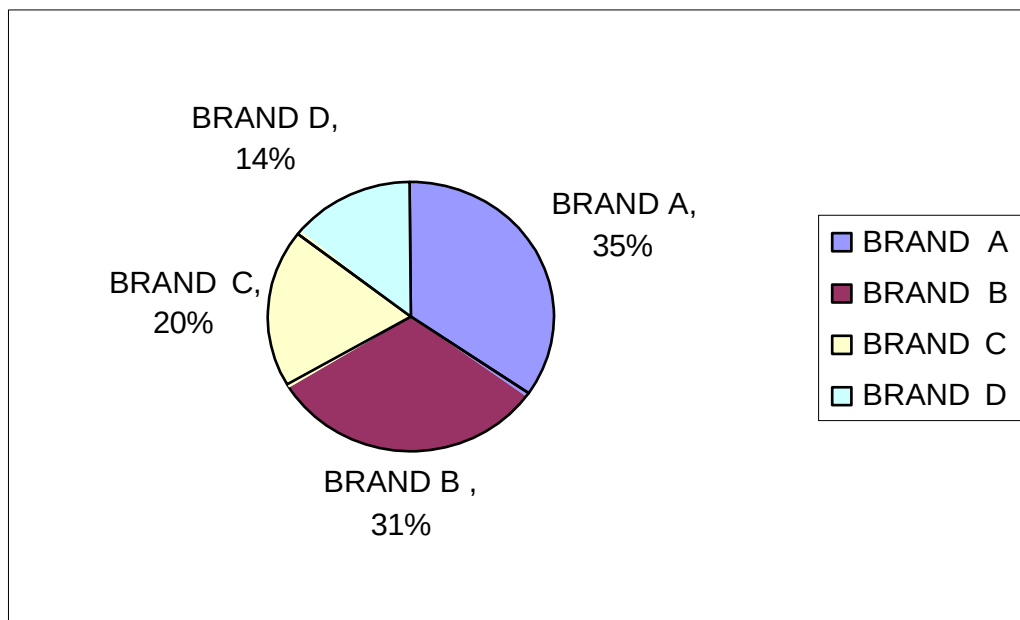
Data can be shown by charts and graphs in addition to the text and tables. Although the text and tables are useful for explaining and interpretation, charts and graphic illustration may add to the value of information because they provide information to the reader in a glance. Due to availability of computer software, it is now very easy and quick to make these charts and graphs. There are many kinds of charts that can be used in data analysis, but we will mention only three types which are more common: Pie chart, Line chart (graph), Bar chart.

#### **Pie Chart**

Pie chart is probably the most familiar chart used in representing quantitative data. A pie chart is simply a circle divided into sections, with each of the sections representing a portion of the total. As the sections are presented as part of the whole, pie chart is particularly more useful in showing relative size. Pie chart is prepared for categorical data.

#### **Example**

■ Share of market of different brands of mobile phone sets.



Pie chart is based on the fact that the circle has 360 degrees. The pie is divided into different slices according to percentage in the category. Different colors can be used. To show emphasis on some category of data, the relevant portion of the pie can be lifted (it called exploding the pie).

A pie chart can have many sections or slices, but it is recommended that no more than six sections should be generated in a pie.

### Example

In order to determine the significant source of business, WR hotel examined the check- in cards of 1000 customers randomly. They found the following break-up of data.

|                      |             |
|----------------------|-------------|
| Individual travelers | 230         |
| Tour groups          | 125         |
| Business travelers   | 378         |
| Government officials | 143         |
| Others               | <u>124</u>  |
| Total                | <u>1000</u> |

### Solution

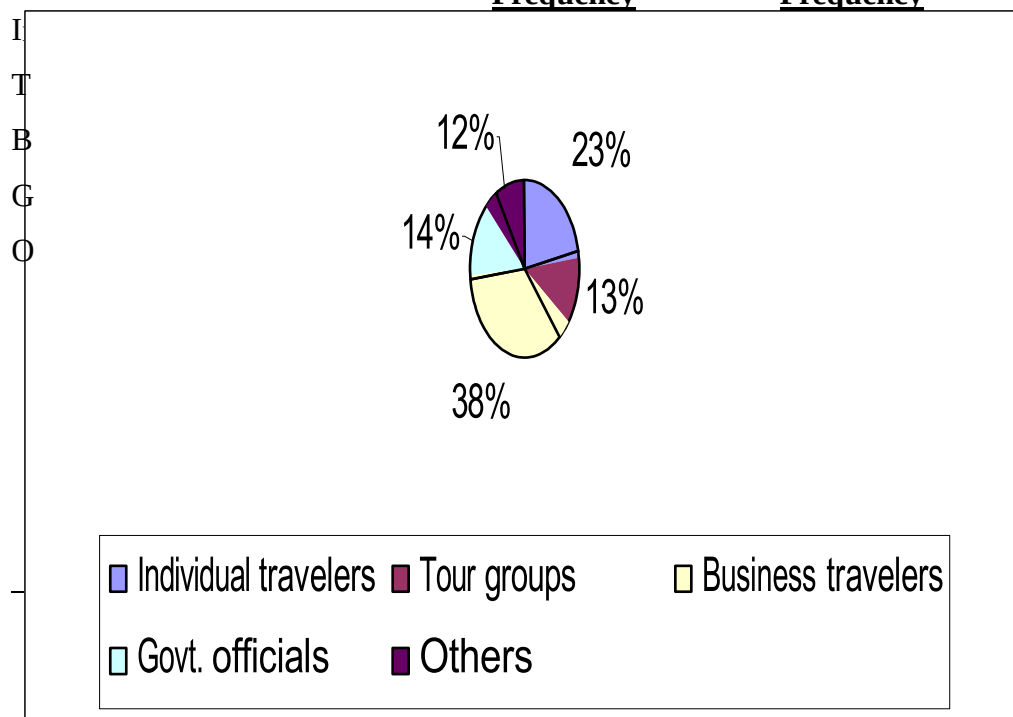
#### RELATIVE FREQUENCIES

**Absolute**

**Relative**

**Frequency**

**Frequency**

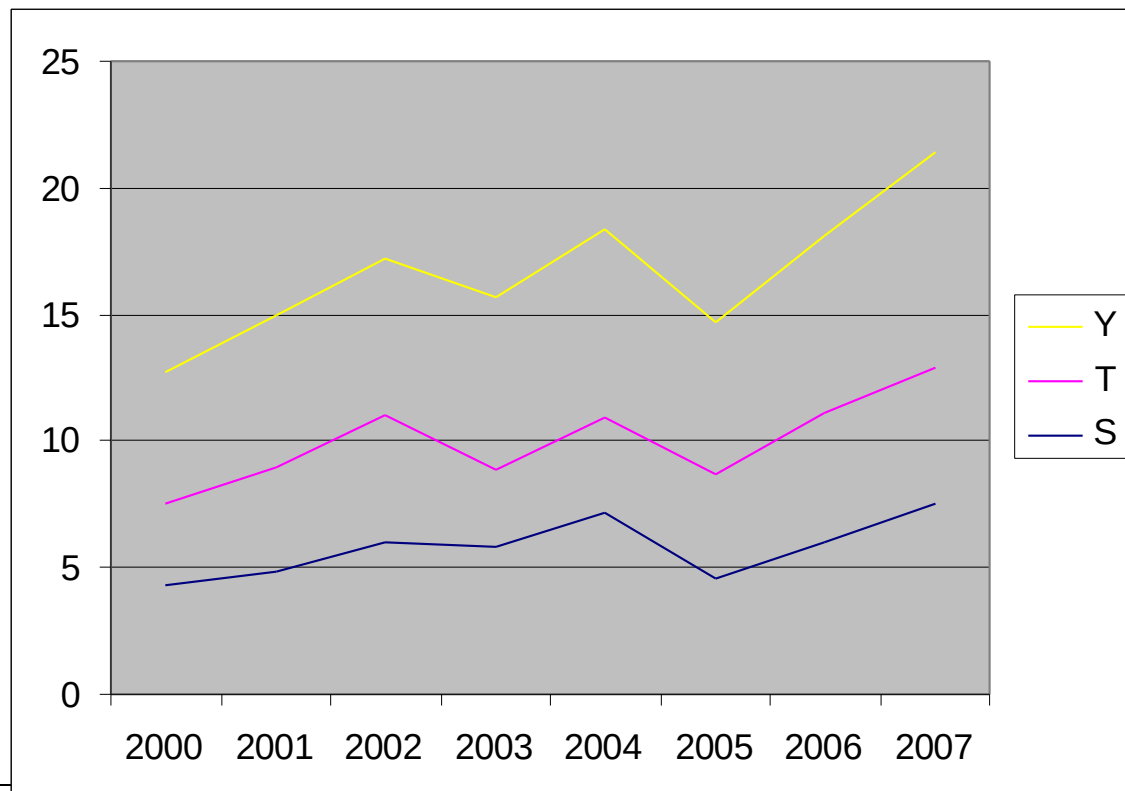


### Line Chart or Graph

Pie chart is one scale chart. It is best used for static comparison that is the phenomenon at one time. The bar chart is having two dimensions one of which usually is the time. It shows dynamic relation of the changes with time such as time series fluctuations. In the chart X-axis represents time and Y-axis, the values of the variables. More than one variable can be plotted on the same graph but each variable is represented by different lines in different colors or form (dashes or dots) with explanations in the legend at the bottom of the graph.

### Example

| Year | S   | T   | Y   |
|------|-----|-----|-----|
| 2000 | 4.3 | 3.2 | 5.2 |
| 2001 | 4.8 | 4.2 | 6   |
| 2002 | 6   | 5   | 6.2 |
| 2003 | 5.8 | 3.1 | 6.8 |
| 2004 | 7.2 | 3.7 | 7.5 |
| 2005 | 4.6 | 4.1 | 6   |
| 2006 | 6   | 5.1 | 7   |
| 2007 | 7.5 | 5.4 | 8.5 |

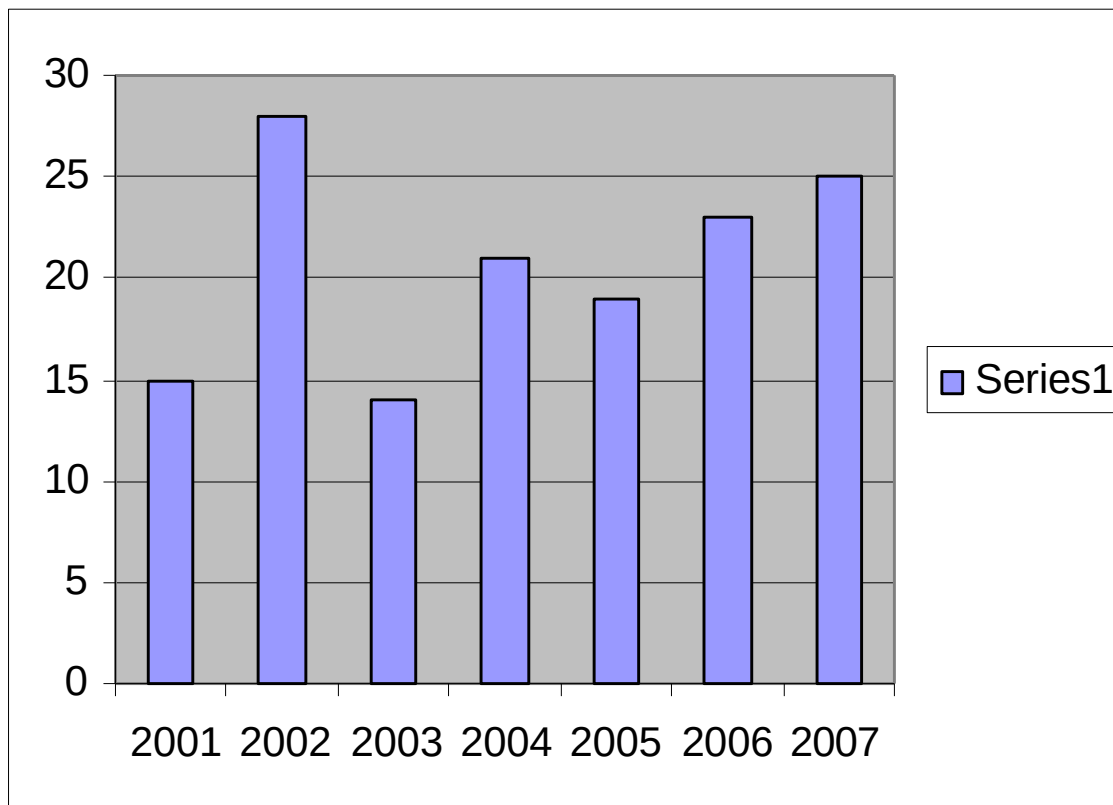


In a bar chart, each category is depicted by a bar, vertical or horizontal. The length or height of the bar shows the frequency or percentage of observations falling into a category. The lengths or heights of different bars allow the user to compare the magnitudes of different categories easily.

### Example

The expansion of a bank in terms of opening of new branches from 2001 to 2007 was as follows

| Years | Values |
|-------|--------|
| 2001  | 15     |
| 2002  | 28     |
| 2003  | 14     |
| 2004  | 21     |
| 2005  | 19     |
| 2006  | 23     |
| 2007  | 25     |



### Variation in Bar Chart

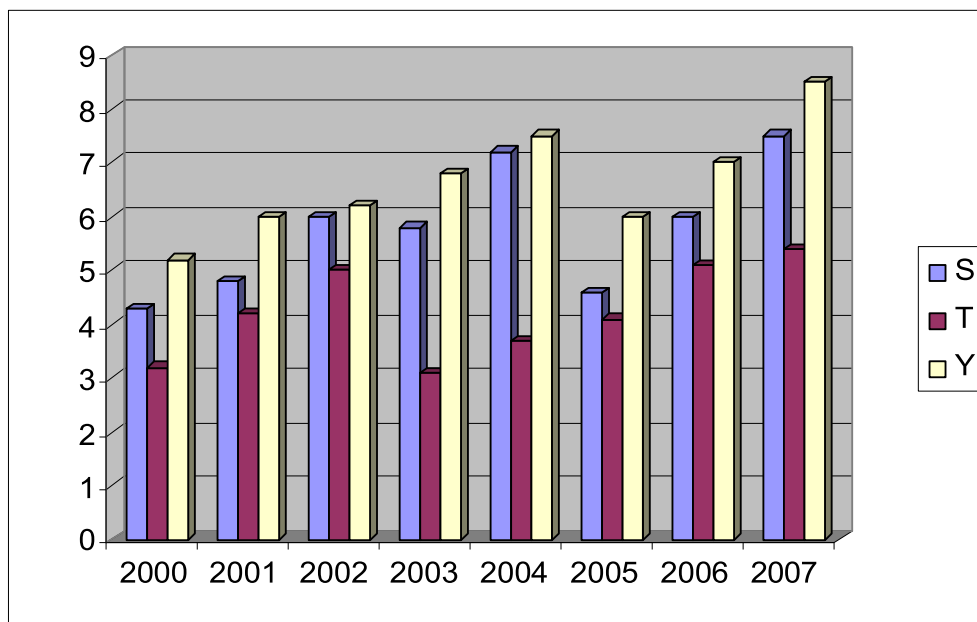
Bar chart has variation. Pictures can be used instead of bars e.g people for population, pictures of cars of automobile production, and piles of 1000 rupees note for sales. Another variation of bar chart used frequently is grouped bar chart where more than one category can be captured and can be compared side by side in different colours. Let us again take the data of split air conditioners as given in the line graph.

### Example

A survey of retail sales of split air conditioners of 3 brands S,T,Y from 2000 to 2007, revealed the following values in million of rupees.

Sales of split air conditioners in million of rupees

| Year | S   | T   | Y   |
|------|-----|-----|-----|
| 2000 | 4.3 | 3.2 | 5.2 |
| 2001 | 4.8 | 4.2 | 6   |
| 2002 | 6   | 5   | 6.2 |
| 2003 | 5.8 | 3.1 | 6.8 |
| 2004 | 7.2 | 3.7 | 7.5 |
| 2005 | 4.6 | 4.1 | 6   |
| 2006 | 6   | 5.1 | 7   |
| 2007 | 7.5 | 5.4 | 8.5 |



## ***Lecture#29***

### **Data analysis**

#### **Hypothesis Testing**

- Hypothesis is educated guess, a tentative statement about the relationship between two or more variables.
- It is to be empirically tested and be stated before the marketing project begins.
- Hypotheses must be formally stated. These are focal points for researchers in marketing.
- Hypotheses may be in operational (general) terms or null and alternative forms.

#### **Null and Alternative Form of Hypothesis**

Testing of hypothesis usually begins with stating the hypothesis in a null and alternative form. For example, we might want to see whether mean age of a class of consumer is 30 years. In this case The null hypothesis ( $H_0$ ) will be

$$H_0: \mu = 30$$

We can write the null and alternative hypothesis as:

$$H_0: \mu = 30$$

$$H_1: \mu \neq 30$$

#### **One tailed and two tailed test**

Previous example of alternative hypothesis is two tailed as we will reject the null hypothesis if the mean age was lesser or greater than 30.

Another alternative hypothesis in this situation could be that the mean age is greater than 30. In this case we would write null and alternate form of hypothesis as:

$$H_0: \mu = 30$$

$$H_1: \mu > 30$$

Here the hypothesis is one tailed as we have a specific direction in mind for the alternative hypothesis. We can also phrase the null hypothesis to cover a range of values. For example,

$$H_0: \mu \leq 30$$

Which implies an alternative hypothesis

$$H_1: \mu > 30$$

Here again one tailed test would apply.

The researcher should be careful to phrase the alternative hypothesis in a way as to accept the alternative hypothesis that is of real interest if null hypothesis is rejected.

#### **One-Tailed or Two-Tailed Test**

Defective parts are more than 2 % - One-tailed

Sales returns are less than 4% p.m.-One-tailed

Within one per cent of the mean – two-tailed

Between 5% and 6% – two-tailed

We use one and two- tailed concept when we look critical values in the probability tables.

We should have this concept clearly we that we can look into the appropriate table.

#### **Steps in Hypothesis Testing**

Following steps are usually followed in hypothesis testing:

- Formulate a null and alternative hypothesis
- Specify the significance level
- Select the appropriate statistical technique according to the nature and type of data collected
- Perform the statistical test applying the technique above
- Look for the value of test statistics (critical value) in the relevant standard normal table on the confidence level as specified in step # 2 above.
- Compare the value of statistics as calculated in step #4 with critical value and accept or reject the hypothesis.
- At the end researcher draws conclusion.

### **Different Statistical Tests**

Which statistical technique or test to select for our analysis or hypothesis testing depends on our objectives of research project. Objectives may be translated into research questions and/or research hypotheses.

There are many statistical tests and techniques which are used in data analysis in marketing research. Some of them are described in the next lectures in detail.

## ***Lecture#30***

### **Data analysis**

### **Chi –Square Test**

$\chi^2$  It is a test of association. It determines whether there is a systematic association in two variables under investigation.

The null hypothesis would be that there is no association (or dependence) between the variables and accordingly an alternative hypothesis will be framed. In this test, observed and expected frequencies computed and cross tabulation is done.

#### **Cross Tabulation**

Cross tabulation shows two or more variables at a time. It merges responses with regard to two or more variables in the same table.

Frequencies of one variable are cross tabulated and distributed according to other categories.

Look at the following data:

Gender of students who visited Lahore zoo:

| Frequency              | Boys | Girls | Total |
|------------------------|------|-------|-------|
| Frequent visitors      | 45   | 20    | 65    |
| Less frequent visitors | 23   | 47    | 70    |
| Total                  | 68   | 67    | 135   |

#### **How Many Variables?**

We may have one or two variables to test through chi- square. Thus the data are called univariate and bivariate respectively. Cross tabulation is done accordingly. We will take example of each in the next pages and apply chi-square statistics according. Let us see this example of univariate data.

#### **Univariate Data – (Example # 01)**

A plastic company sells its products in three primary colors: yellow, blue & red. The marketing manager thinks that customers do not have any color preference. Manager set up a test where 240 purchasers were provided equal opportunity to buy any of the color. The following results were obtained 40 bought blue, 120 bought red and 80 yellow.

Is the thinking of marketing manager correct? Test it at .05 .level.

#### **Table**

- $H_0$  - There is no color preference of purchaser of plastic among three colors
- $H_1$  - There is a color preference

| Color  |       |       |               |                 |                             |
|--------|-------|-------|---------------|-----------------|-----------------------------|
|        | $f_o$ | $f_e$ | $(f_o - f_e)$ | $(f_o - f_e)^2$ | $\frac{(f_o - f_e)^2}{f_e}$ |
| Yellow | 80    | 80    |               |                 |                             |
| Blue   | 40    | 80    | -40           | 1600            | 20                          |
| Red    | 120   | 80    | 40            | 1600            | 20                          |
| Total  |       |       |               |                 | 40                          |

Critical value at 0.05 level degree of freedom

$$V = k-1$$

$$= 3-1=2 \text{ is } 5.99$$

$H_0$  is rejected

$H_1$  accepted

Red most popular color

Blue least

### Univariate Data (Example# 2)

Let us take another example of using Chi- square in the univariate data.

A research company wanted to find out the best quality of picture in various brand of TV. The researcher set placed 6 color TV sets in the lobby of the hotel with brand names covered and asked the people to watch the picture quality of each set and indicate which set had the best quality of picture. The survey continued for three weeks and 1302 people gave their opinion after watching. Data were tabulated as follow.

**Table**

| TV brand | Number Labeling as best picture |
|----------|---------------------------------|
| M        | 675                             |
| N        | 280                             |
| O        | 81                              |
| P        | 119                             |
| Q        | 123                             |
| R        | 22                              |

Test the null hypothesis at  $\alpha = 0.5$ . that all brand of TV have almost the same quality of picture.

Let us prepare a contingency table showing expected values and calculate the  $\chi^2$

| Brand | $f_o$ | $f_e$ | $(f_o - f_e)$ | $(f_o - f_e)^2$ | $\frac{(f_o - f_e)^2}{f_e}$ |
|-------|-------|-------|---------------|-----------------|-----------------------------|
| M     | 675   | 217   | 458           | 209764          | 966.50                      |
| N     | 282   | 217   | 65            | 4225            | 19.47                       |
| O     | 81    | 217   | -136          | 18496           | 85.23                       |
| P     | 119   | 217   | -98           | 9604            | 44.25                       |
| Q     | 123   | 217   | -94           | 8836            | 40.71                       |
| R     | 22    | 217   | -195          | 38025           | 175.23                      |
| TOTAL | 1302  | 1302  |               |                 | 1331.39                     |

Now let us look at the critical value of  $\chi^2$  at  $\alpha = 0.5$  and degree of freedom  $v = k - 1 = 6 - 1 = 5$ .

The critical value of  $\chi^2 = 11.07$ . As the calculated value of  $\chi^2$  is 1331.39 is greater than the critical value 11.07.

Hence null hypothesis is rejected.

## **Lecture#31**

### **Data analysis**

#### **Bivariate Chi-Square**

Suppose that in the survey on the hotel guest satisfaction, a question was asked of all respondents who indicated that they were not likely to return in three hotels A, B and C. These guests were asked to indicate the primary reason for their response. The resultant data are presented in the following paragraph.

The reasons for not planning to return to the hotel: 78 were primarily due to room rent, 70 were primarily due to location, 42 were primarily due to room space, and 39 were due to other reasons. As in previous table, there were 109 guests in the Hotel A, 42 guests in the Hotel B, 78 guests in the Hotel C who were not planning to return to the hotel.

The observed frequencies in the cells of the contingency table represent the joint tallies of the sampled guests with respect to primary reason for not returning and with respect to hotel property.

The null and alternative hypotheses are:

H<sub>0</sub>: There is no relationship between the primary reason for not returning & the hotels.

H<sub>1</sub>: There is a relationship between the primary reason for not returning & the hotels.

#### **Observed Frequencies**

|                                 | <b>HOTEL</b> |          |          |              |
|---------------------------------|--------------|----------|----------|--------------|
| <b>Reason for not Returning</b> | <b>A</b>     | <b>B</b> | <b>C</b> | <b>Total</b> |
| <b>Room rent</b>                | 40           | 14       | 24       | 78           |
| <b>Location</b>                 | 32           | 12       | 26       | 70           |
| <b>Room space</b>               | 19           | 8        | 15       | 42           |
| <b>Other</b>                    | 18           | 8        | 13       | 39           |
| <b>Total</b>                    | 109          | 42       | 78       | 229          |

To test this null hypothesis of independence against the alternate that there is a relationship between the two categorical variables, following equation is used to compute the test static as follows:

$$\chi^2 = \frac{\sum (f_o - f_e)}{f_e}$$

**Computed the Expected Frequencies**

The expected frequency in a cell is the product of its row total and column divided by the over all sample size

$$fe = \frac{\text{row total} * \text{column total}}{n}$$

Row total = sum of all frequencies in a row

Column total = sum of all frequencies in a column

n = overall sample size

**EXPECTED FREQUENCIES**

|                                 | <b>HOTEL</b> |          |          |              |
|---------------------------------|--------------|----------|----------|--------------|
| <b>Reason for not Returning</b> | <b>A</b>     | <b>B</b> | <b>C</b> | <b>Total</b> |
| <b>Room rent</b>                | 37.12        | 14.30    | 26.56    | 78           |
| <b>Location</b>                 | 33.31        | 12.83    | 23.84    | 70           |
| <b>Room space</b>               | 19.99        | 7.7      | 14.30    | 42           |
| <b>Other</b>                    | 18.56        | 7.15     | 13.28    | 39           |
| <b>Total</b>                    | 109          | 42       | 78       | 229          |

The test statistics shown in equation of approximately follows a chi-square distribution with degrees of freedom equal to the number of rows in the contingency table minus 1 times the number of columns in the table minus 1. For an r\*c contingency table there are (r-1)(c-1) degrees of freedom:

$$\text{Degrees of freedom} = (r-1)(c-1)$$

The  $\chi^2$ -test statistics for these data is computed as shown in table:

| CELL               | Fo | Fe    | (fo-fe) | (fo-fe) <sup>2</sup> | (fo-fe) <sup>2</sup> /fe |
|--------------------|----|-------|---------|----------------------|--------------------------|
| Room rent/Hotel A  | 40 | 37.12 | 2.88    | 8.29                 | 0.22                     |
| Room rent/Hotel B  | 14 | 14.30 | -0.3    | .09                  | 0.006                    |
| Room rent/Hotel C  | 24 | 26.56 | -2.56   | 6.55                 | 0.25                     |
| Location/Hotel A   | 32 | 33.31 | -1.31   | 1.71                 | 0.05                     |
| Location/Hotel B   | 12 | 12.83 | -.083   | 0.688                | 0.05                     |
| Location/Hotel C   | 26 | 23.84 | 2.16    | 4.66                 | 0.19                     |
| Room space/Hotel A | 19 | 19.99 | -.099   | 0.98                 | 0.04                     |
| Room space/Hotel B | 8  | 7.7   | 0.3     | 0.09                 | 0.01                     |
| Room space/Hotel C | 15 | 14.30 | 0.7     | 0.49                 | 0.03                     |
| Other/Hotel A      | 18 | 18.56 | -.056   | 0.31                 | 0.01                     |
| Other/Hotel B      | 8  | 7.15  | 0.85    | 0.72                 | 0.100                    |
| Other/Hotel C      | 13 | 13.28 | -.28    | 0.07                 | 0.005                    |
|                    |    |       |         |                      | 0.98                     |

Using a level of significance of  $\alpha=0.05$ , the computed test statistics,  $\chi^2 = 9.82$ , is greater than 12.59, the upper-tail critical value from the chi-square distribution with  $(4-1)(3-1)=6$  degrees of freedom, so the null hypothesis of independence is accepted.

### Another Example of Chi-Square

#### Calculation of Education-Confidence

|                | Education    |           |              |       |
|----------------|--------------|-----------|--------------|-------|
|                | Under Metric | Upto B.A. | M.A. & Above | Total |
| A great extent | 95           | 57        | 39           | 191   |
| Some extent    | 272          | 274       | 214          | 760   |
| Very little    | 140          | 163       | 148          | 451   |
| Total          | 507          | 494       | 401          | 1402  |

| Cell #              | Observed<br>$f_o$ | Expected<br>$f_e$ | Contribution<br>$\frac{(f_o - f_e)^2}{f_e}$ |
|---------------------|-------------------|-------------------|---------------------------------------------|
| Cell <sub>1,1</sub> | 95                | 69.1              | 9.71                                        |
| Cell <sub>1,2</sub> | 57                | 67.3              | 1.58                                        |
| Cell <sub>1,3</sub> | 39                | 54.6              | 4.46                                        |
| Cell <sub>2,1</sub> | 272               | 274.8             | 0.03                                        |
| Cell <sub>2,2</sub> | 274               | 267.8             | 0.14                                        |
| Cell <sub>2,3</sub> | 214               | 217.4             | 0.05                                        |
| Cell <sub>3,1</sub> | 140               | 163.1             | 3.27                                        |
| Cell <sub>3,2</sub> | 163               | 158.9             | 0.11                                        |
| Cell <sub>3,3</sub> | 148               | 129.0             | <u>2.80</u>                                 |
|                     |                   |                   | $\chi^2 = 22.15$                            |

Given a significance level of 0.01 and 4 degrees of freedom [ $df=(r-1)(c-1)$ ], the critical value of  $\chi^2$  for the contingency table is 15.09. The hypothesis is to be tested is

$H_o$ : the variables are independent

$H_a$ : the variables are not independent

And the decision rule is

If  $\chi^2 \leq 15.09$ , accept  $H_o$

If  $\chi^2 \geq 15.09$ , reject  $H_o$

### Reject or Accept Null Hypothesis

The table shows the computation of the chi-square test statistics for the data on Education. Since the value of the test statistic is greater than the critical value ( $22.15 > 15.09$ ), the null hypothesis is rejected; the two variables are not independent. There is a relationship between education & confidence in television programs. As before, insights into the relationship can be obtained by investigating individual contributions.

## *Lecture#32*

### **Correlation and Regression**

Many marketing research projects are carried out to study relationships- relationship between sales revenues and advertising expenses, relationship between market share and the number of salespeople, relationship between sales and distance to the nearest competing stores.

Some association between categories obtained from nominal data has already been discussed in chi-square. Association between two interval-scaled data is measured through correlation.

Correlations are various types and used for various purposes such as nonmonotonic, monotonic, linear, curvilinear, rank order etc.

Let us discuss some of them.

#### **Non-monotonic Relationship**

A non-monotonic relationship is one where presence or absence of one variable is systematically associated with the presence or absence of another variable but there is no discernable direction of relationship. However the relationship exists.

For example in a fast food restaurant, the experience tells us that morning customers buy tea but afternoon customers typically purchase soft drink. This relationship is no way exclusive. There is no guarantee that morning customer would always order tea and afternoon customers always order soft drink. However a relationship does exist.

#### **Monotonic Relationship**

A monotonic relationship is one when a researcher can assign only a general direction association between two variables. Monotonic relationship can be either increasing or decreasing. If one variable increases and the other also increases, it is called monotonic increasing relationship. On the other hand, monotonic decreasing relationship would be when one variable increases but the other decreases. Monotonic means that the direction of the relationship is described. However exact amount of change in one variable as the other variable changes cannot be indicated.

#### **LINEAR CORRELATION**

Correlation or linear correlation is a measure of nature and degree of association or co-variation between two variables. These variables are measured by interval or ratio scales. Co-variation is defined as an amount of change in one variable systematically associated with a change in another variable. Coefficient of Correlation( $r$ ) is the index number that communicates the strength of association between two variables say  $X$  and  $Y$ . Strength is indicated by the absolute size of correlation. Here is a rule of thumb about the strength of correlation (after it is proved that correlation is statistically significant)

**Range of Coefficient****Strength of Association**

|                       |           |
|-----------------------|-----------|
| 00 to $\pm 20$        | None      |
| $\pm 21$ to $\pm 40$  | Very weak |
| $\pm 41$ to $\pm 80$  | Moderate  |
| $\pm 81$ to $\pm 100$ | Strong    |

Correlation coefficients that are closer to zero indicate that there is no systematic association between the two variables and the ones which are closer to + 1.0 show that there is some systematic association between two variables.

Direction of association is indicated by the sign (+ or -) of the size of the coefficient. If the sign is positive, it means there is positive direction of the co-variation between the two variables, that is, both variables change in the same direction. In this case if variable X increases, Y would also increase. On the other hand a negative sign in correlation indicates a negative co-variation which means if one variable increases the other would decrease and vice versa.

**Example**

If we find that number of years of education (variable X) and hours in reading news paper (variable Y) have a correlation of 0.87, it means they are positively correlated. It will be interpreted like this: people with more education spend more time on reading newspaper. But if we find a correlation of -0.81 between smoking cigarettes and education, it means more educated people smoke less.

**Product Moment Correlation**

Product Moment correlation is the statistic widely used in determining the size or strength of association between two intervals or ratio scaled variables. It is also known as Pearson Correlation Coefficient as it was originally proposed by Karl Pearson. Sometimes it is also called as bivariate correlation, simple correlation or correlation coefficient. Product Moment Correlation is computed with this formula.

$$r_{xy} = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

Where X and Y are the two variables,  $\bar{x}$  and  $\bar{y}$  are their respective means and  $r_{xy}$  is the correlation between X and Y.

Let us see some examples

**Example 1**

A company wants to find out if the number of sales persons in a sales territory has some relationship with the sales revenue. From a random sample of 10 territories following data were obtained

| Territory # | # of Sales Persons | Sales in 000 Rupees |
|-------------|--------------------|---------------------|
| 1           | 5                  | 261                 |
| 2           | 7                  | 288                 |
| 3           | 6                  | 381                 |
| 4           | 9                  | 412                 |
| 5           | 12                 | 440                 |
| 6           | 8                  | 317                 |
| 7           | 11                 | 567                 |
| 8           | 16                 | 572                 |
| 9           | 13                 | 428                 |
| 10          | 7                  | 317                 |

**Solution**

| # of sales person X | Sales in 000 Y  | $(x - \bar{x})$ | $(x - \bar{x})^2$ | $(y - \bar{y})$ | $(y - \bar{y})^2$ | $(x - \bar{x})(y - \bar{y})$ |
|---------------------|-----------------|-----------------|-------------------|-----------------|-------------------|------------------------------|
| 5                   | 261             | -4.4            | 19.36             | -127            | 16129             | 558.8                        |
| 7                   | 288             | -2.4            | 5.76              | -100            | 10000             | 240                          |
| 6                   | 381             | -3.4            | 11.56             | -7              | 49                | 23.8                         |
| 9                   | 412             | -.4             | -.16              | 24              | 576               | -9.6                         |
| 12                  | 440             | 2.6             | 6.76              | 52              | 2704              | 135.2                        |
| 8                   | 317             | -1.4            | 1.96              | -71             | 5041              | 99.4                         |
| 11                  | 567             | 1.6             | 2.56              | 179             | 32041             | 286.4                        |
| 16                  | 569             | 6.6             | 43.56             | 181             | 32761             | 1194.6                       |
| 13                  | 428             | 3.6             | 12.96             | 40              | 1600              | 144                          |
| 7                   | 317             | -2.4            | 5.76              | -71             | 5041              | 170.4                        |
| $\bar{x} = 9.4$     | $\bar{y} = 398$ |                 | $\Sigma = 110.4$  |                 | $\Sigma = 104942$ | $\Sigma = 2843$              |

$$r_{xy} = \frac{\Sigma (x - \bar{x})(y - \bar{y})}{\sqrt{\left( \Sigma (x - \bar{x})^2 \right) \left( \Sigma (y - \bar{y})^2 \right)}}$$

$$= \frac{2843}{3403.76}$$

There is a medium positive correlation between the two variables.

$$= .84$$

Let us take another example.

**Example II**

A researcher is interested to find out whether the high price of large refrigerators compensates in terms of saving of energy. He collected data on price and annual cost of consumption of electricity in terms of rupees from random sample of 8 brands of refrigerators. The data are presented below.

| Refrigerator Brand | Price Rs. 000 | Annual cost of Consumption on electricity Rs. 000 |
|--------------------|---------------|---------------------------------------------------|
| A                  | 85            | 4.8                                               |
| B                  | 76            | 5.4                                               |
| C                  | 90            | 5.8                                               |
| D                  | 87            | 6.6                                               |
| E                  | 110           | 7.7                                               |
| F                  | 80            | 6.6                                               |
| G                  | 65            | 7.0                                               |
| H                  | 75            | 8.1                                               |

Find coefficient of correlation  $r$ . What do you say about it?

| # of sales persons X | Sales in 000 Rs. Y | $(x - \bar{x})$ | $(x - \bar{x})^2$ | $(y - \bar{y})$ | $(y - \bar{y})^2$ | $(x - \bar{x})(y - \bar{y})$ |
|----------------------|--------------------|-----------------|-------------------|-----------------|-------------------|------------------------------|
| 85                   | 4.8                | 1.5             | 2.25              | -1.7            | 2.89              | -2.55                        |
| 76                   | 5.4                | -7.5            | 56.25             | -1.1            | 1.21              | 8.25                         |
| 90                   | 5.8                | 6.5             | 42.25             | -.7             | .49               | -4.55                        |
| 87                   | 6.7                | 3.5             | 12.25             | .1              | .01               | .35                          |
| 110                  | 7.7                | 26.5            | 702.25            | 1.2             | 1.44              | 31.8                         |
| 80                   | 6.6                | -3.5            | 12.25             | .1              | .01               | -.35                         |
| 65                   | 7.0                | -18.5           | 342.25            | .5              | .25               | -9.25                        |
| 75                   | 8.1                | -8.5            | 72.25             | 1.6             | 2.56              | -13.6                        |
| $\bar{x} = 83.5$     | $\bar{y} = 6.5$    |                 | $\Sigma = 1242.0$ |                 | $\Sigma = 8.86$   | $\Sigma = 10.1$              |

$$r_{xy} = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

$$= \frac{10.01}{10.49}$$

$$= .96$$

There is a strong positive correlation between the two variables.

### Rank Order Correlation

We use Rank Order Correlation coefficient in data analysis to measure the monotonic relationship between two variables measured on an ordinal scale. That is when the data are ordered into ranks. Spearman's Rank Order Correlation which measures the direction and degree of association between two sets of rankings is found with the help of following formula.

**Where**

$$r_s = 1 - \frac{6(\sum d^2)}{n(n^2 - 1)}$$

$r_s$  = Spearman's rank order correlation

$d$  = difference of ranks in the paired ranking

$n$  = number of items ranked

Ranking of various tooth paste brands according to consumer perception on their decay prevention and whitening ability.

| Brand | Decay prevention rank | Whitening ability rank | $d$ | $d^2$ |
|-------|-----------------------|------------------------|-----|-------|
| G     | 1                     | 7                      | -6  | 36    |
| H     | 2                     | 8                      | -6  | 36    |
| I     | 7                     | 4                      | 3   | 9     |
| J     | 5                     | 3                      | 2   | 4     |
| K     | 3                     | 6                      | -3  | 9     |
| L     | 6                     | 1                      | 5   | 25    |
| M     | 8                     | 2                      | 6   | 36    |
| N     | 4                     | 5                      | -1  | 1     |

The computation of spearman rank order correlation in this example is as follows:

$$\begin{aligned}r_s &= 1 - \frac{6(\sum d^2)}{n(n^2 - 1)} \\&= 1 - \frac{6 \times 156}{8(8^2 - 1)} \\&= 1 - \frac{936}{8(63)} \\&= 1 - 1.86 \\&= -.86\end{aligned}$$

A Spearman rank order correlation of  $-.86$  shows a fairly strong relationship between the two rank order i.e. decay prevention and whitening ability for the tooth paste brands under study. Negative sign indicates that the relationship is negative which means if the ranks are higher on decay prevention; these are lower on whitening ability. These are the perceived rankings by the respondent.

Let us take another example.

### Example: Spearman's Rank Order Correlation

Two judges were asked to rate six brands of tissue papers. Their ratings are given below. Find out the Spearman's rank order correlation between the ratings assigned by two judges

| Tissue Brand | Judge I Rank | Judge II Rank |
|--------------|--------------|---------------|
| G            | 2            | 6             |
| H            | 3            | 3             |
| I            | 6            | 5             |
| J            | 1            | 4             |
| K            | 5            | 2             |
| L            | 4            | 1             |

| Tissue Brand | Judge I Rank | Judge II Rank | $d$ | $d^2$ |
|--------------|--------------|---------------|-----|-------|
| G            | 2            | 6             | -4  | 16    |
| H            | 3            | 3             | 0   | 0     |
| I            | 6            | 5             | 1   | 1     |
| J            | 1            | 4             | -3  | 9     |
| K            | 5            | 2             | 3   | 9     |
| L            | 4            | 1             | 3   | 9     |

$$\begin{aligned}r_s &= 1 - \frac{6(\sum d^2)}{n(n^2 - 1)} \\&= 1 - \frac{264}{210} \\&= 1 - 1.257 \\&= -.257 \\&= -.26\end{aligned}$$

The Spearman rank correlation rank coefficient is  $-.26$  which is very weak and it is in opposite direction.

## Lecture#33

### Testing the difference between the Means

Marketing research may be facing the problem testing the hypothesis relating to the difference between the means. Such means may be the sample mean and population mean or two independent means.

Chi-square is one of the procedures we have studied to test the significance of difference of data derived from nominal data. For ordinal data, we may use Spearman's correlation.

We use different statistics to test the difference between means based on interval data. These statistical tests are classified whether one or two samples are involved. One mean generated from a sample may be compared with a mean by hypothesized to exist in the population; or two means generated from independent samples.

z-test and the t-test are appropriate to test the difference between the means. The choice is made on the researcher's knowledge about the standard deviation of the population and the sample size. It is appropriate to use these test in the following situations;

If sample size is more than 30 & population standard deviation is unknown, use z-test, and;

If sample size is less than 30 and population is unknown, use t-test.

#### How to Calculate Z or T?

In order to calculate z or t statistics, we should have calculated population mean, standard deviation of one or more samples that we are testing. Then we should calculate the standard error of the mean difference. In case of one mean the standard error of the mean

$$S_{\bar{x}} = \frac{S}{\sqrt{n}} \quad \bar{x}$$

In case of two means it will be

$$S_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$$

The z or t is calculated by the following formulas.

One mean

$$t \text{ (or } z) = \frac{\mu - \bar{x}}{S_{\bar{x}}}$$

Where  $\mu$ =population mean (hypothesized)  
 $\bar{x}$ =sample mean

$S_x$ =standard error of the mean difference

- Two means

$$t \text{ (or } z) = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{S_{\bar{X}_1 - \bar{X}_2}}$$

- Where

$\bar{X}_1$  =Sample mean for the first sample

$\bar{X}_2$  =Sample mean for the second sample

$\mu_1$  =Unknown mean for the first population

$\mu_2$  =Unknown mean for the second population

$S_{\bar{X}_1 - \bar{X}_2}$  =Standard error of the estimate for difference between means

Let us illustrate these tests with the help of same examples.

### Example I

A shoe company is investigating the desirability of adding a new design of shoes to its shop. The company has decided that it will add this design only if sells 100 pairs per week in each store. It was put on 40 different shops randomly and data on their sale was calculated. The data revealed an average sale of 106 pairs per week per store. The standard deviation was worked out to be 13.8. Should the company introduce new design?

### Solution

■  $H_0$        $\mu \leq 100$

■  $H_1$        $\mu > 100$

■ Mean    = 106

■  $S$         = 13.8

■  $S_x$        = 2.18

Since the sample is more than 30 and variance of the population is unknown, we will use z-test, z will be calculated as:

$$\begin{aligned} z &= (106-100)/2.18 \\ &= 6/2.18 \\ &= 2.75 \end{aligned}$$

As the calculated value of z (2.75) exceeds the critical value in the table of 1.96 at 0.05 confidence level so the null hypothesis is rejected. The company should go ahead and introduce the new shoes.

**Example of Z-Test for Two Independent Means**

Let us take the example of z-test for two means. Suppose two independent samples of 50 each of the two cola beverages A and B yield the following data on average weekly per household consumption in Gulberg area of Lahore.

Cola beverage A mean consumption=6.3liters

Cola beverage A standard deviation =2.1

Cola beverage B mean consumption=5.7liters

Cola beverage B standard deviation =1.3

**Solution**

|                   |                 |                        |
|-------------------|-----------------|------------------------|
| $\bar{X}_1 = 6.3$ | Null Hypothesis |                        |
| $\bar{X}_2 = 5.7$ | $H_0$           | $\mu_1 = \mu_2$        |
| $S_1 = 2.1$       | or              | $\mu_1 - \mu_2 = 0$    |
| $S_2 = 1.3$       |                 |                        |
| $n_1 = 50$        | $H_1$           | $\mu_1 \neq \mu_2$     |
| $n_2 = 50$        | or              | $\mu_1 - \mu_2 \neq 0$ |

**Standard deviation of two means**

$$\begin{aligned}
 S_{\bar{X}_1 - \bar{X}_2} &= \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} \\
 &= \sqrt{\frac{(2.1)^2}{50} + \frac{(1.3)^2}{50}} \\
 &= 0.349
 \end{aligned}$$

As the sample is more than 30, we will select z-test in this case. Let us calculate z:

$$\begin{aligned}Z &= \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{S_{\bar{X}_1 - \bar{X}_2}} \\Z &= \frac{(6.3 - 5.7) - 0}{0.349} \\Z &= 1.72\end{aligned}$$

It is two tailed test and critical value of z at 0.05=1.96. Calculated value of z which is 1.72 is less than critical value therefore we will reject the null hypothesis. Conclusion can be drawn that is no significant difference between the average weekly consumption per household of the two brands.

## Lecture #34

### Testing the Difference between Means

#### t - Test

You may recall that we use t-test if the sample is less than 30 and population variance is not known. z and t are calculated in the same manner with the same formula but in reading the critical value of t from the table of t distribution, we need degree of freedom which is calculated as under  
Degree of freedom =  $(n_1 + n_2 - 2)$

Now we will illustrate t-test with the help of some examples.

#### t -Test for One Mean

Suppose a departmental store manager believes that an average number of customers who exchange merchandise each day is not more than 20. The store records the number of exchanges each day for 26 days it was open for a given month. The researcher calculates a sample mean equal to 22 and standard deviation equal to 5. Do you think manager's assumption is correct?

#### Solution

$$\bar{X} = 22$$

$$n = 26$$

$$s = 5$$

$$H_0: \mu \leq 20$$

$$H_1: \mu > 20$$

$$S_x = 5/5.1 = 0.98$$

$$t = (22 - 20) / 0.98 \\ = 2.04$$

Degree of freedom =  $n - 1 = 25$

Critical value at 0.05 level of significance at 25 df = 1.70.

As the calculated t is greater than 1.70,  $H_0$  is rejected.

Conclusion: Average number of customers who exchange merchandise each day in the store is more than 20. Assumption is incorrect.

#### t -Test for Two Independent Means

A manufacturer of car polish has recently developed a new polish. The company is considering two different containers for the polish, one metal and one plastic. The company will make final decision after test marketing. The company introduced metal and plastic containers on 10 independent random samples of 10 stores each. The results were as follows:

#### Table

| Store # | Plastic container | Metal container | Store # | Plastic container | Metal container |
|---------|-------------------|-----------------|---------|-------------------|-----------------|
| 1       | 416               | 340             | 6       | 358               | 358             |
| 2       | 327               | 385             | 7       | 400               | 352             |
| 3       | 370               | 380             | 8       | 394               | 390             |
| 4       | 380               | 376             | 9       | 390               | 360             |
| 5       | 400               | 382             | 10      | 381               | 385             |

Which container they should introduce?

### Solution

Null hypothesis

H0  $\mu_1 = \mu_2$

Alternate Hypothesis

H1  $\mu_1 \neq \mu_2$

Mean of plastic container  $\bar{X}_1 = 381.6$

Mean of metallic container  $\bar{X}_2 = 370.8$

Standard deviation of plastic container

$s_1 = 25.29$

Standard deviation of metallic container

$s_2 = 16.97$

(In calculating s in interval data, we derive the sum of squared deviation by n-1)

$$\begin{aligned}
 S_{\bar{X}_1 - \bar{X}_2} &= \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} \\
 &= \sqrt{\frac{(25.29)^2}{9} + \frac{(16.97)^2}{9}} \\
 &= 9.67
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{S_{\bar{X}_1 - \bar{X}_2}} \\
 &= \frac{(381.6) - (370.8)}{9.67} \\
 &= 1.12
 \end{aligned}$$

Critical value of two tailed test at  $(n_1 + n_2 - 2)$  is  $= 10 + 10 - 2 = 18$  df at 0.05 level is 2.10 which is greater than calculated value. It means null hypothesis is accepted.

Conclusion: Company can introduce any container. Customers do not have special preference for either.

## ***Lecture #35***

### **Analysis of Variance**

We have studied how to test difference between two independent means. We use t or z tests. But if the market researcher wants to examine the difference among more than two means, in that case, analysis of variance abbreviated as ANOVA is used to accomplish these comparisons. Although ANOVA has traditionally been used to analyze experimental data, it can also be used for analyzing survey or observational data.

#### **ANOVA**

When we are using ANOVA, we have one or more independent variables which must be non-metric or categorical and a dependent variable which is metric (measured through interval or ratio scale). Independent variables which are categorical are also called factors. A particular level of factors or independent variables is called treatment. If one factor (although at different levels) is the treatment, one-way analysis of variance is used. If more than one factor are the treatment, n-way analysis variance is used. If the set of independent variables contain both categorical and metric (involving interval or ratio scales), another technique called analysis of covariance (ANCOVA) is used. Now we will study the use of one-way ANOVA.

#### **One-way analysis of variance**

One-way ANOVA is used when researcher is interested to examine the differences in the mean values of the dependent variable for several levels of single independent variable or factor. For example

- Are the attitudes of various channels of distribution, say wholesalers, retailers, or agents, different towards the company's distribution policies?
- Do different regions differ in sales?
- Are the results of various test markets at different price levels really different?
- Are brands evaluated differently by different groups exposed to ads?

ANSWER TO SUCH QUESTIONS CAN BE FOUND BY USING ONE-WAY ANALYSIS OF VARIANCE (ANOVA).

The statistics related to one-way analysis of variance are MEAN SQUARE, SUM OF SQUARES BETWEEN or SS between, SUM OF SQUARES total or SS total, and SUM OF SQUARES within or SS within and F ratios. SS total is also called total variation (TV), SS between or variation between the groups (VB), and SS within or variation within the group (VW)

#### **Conducting One-Way ANOVA**

Following is the procedure to conduct one-way analysis of variance.

**A. Identifying the variables:** The researcher first of all identifies the independent variable with all its levels and dependent variable. Independent variable is generally denoted by X and dependent variable by Y. In one-way analysis of variance, is one categorical variable having more than two categories say number of categories is c. If each category has n observations, the total sample size will be  $n \times c$ .

**Prepare Null and alternate hypothesis.**

**B. Measure and decompose the variation:** Find out the total variation in Y and separate it in variation between and variation within. This can be expressed by this equation: **SS total = SS between + SS within**

SS total is computed by squaring the deviation of each score from the grand mean and summing these squares.

SS within is the variability that we observe within each group, is calculated by squaring the deviation of each score from its group mean and summing these scores. The formula of variation within will be:

$$\text{SS within} = \text{Sum } c (x - \bar{x})^2$$

SS between is the variability of the group means about the grand mean and computed by squaring the deviation of each group mean from the grand mean. This will be computed with this formula:

SS between is the variability of the group means about the grand mean and computed by squaring the deviation of each group mean from the grand mean, multiplying by n and summing them up. This will be computed with this formula:

$$\text{SS between} = \text{Sum } [n (\bar{x} - \bar{\bar{x}})^2]$$

After we have calculated SS total, SS between and SS within, we should now compute variance or mean square. This is done by dividing various sum of squares by appropriate degree of freedom.

To get mean square between groups (MS between) SS between is divided by categories minus one (c-1), i.e.

$$\text{MS between} = \frac{\text{SS between}}{c-1}$$

For obtaining Mean Square within groups (MS), SS within is divided by cn-c degree of freedom, that is,

$$\text{MS within} = \frac{\text{SS within}}{cn - c}$$

Finally F-ratio is found. It is calculated by dividing MS between by MS within. The between Mean Square is used as numerator and within Mean Square is used as denominator. We can say that

$$F = \frac{\text{MS between}}{\text{MS within}}$$

F-ratio is then checked against the critical value in the relevant table for comparison. At the end, null hypothesis is accepted or rejected and conclusion is drawn.

### Example

Let us illustrate the concept with the help of an example:

A company wants to launch a new shampoo but they are not sure which price will bring more sales. They ran a test in the market before launching the product in order to decide the final price. To test the pricing effect, the company chose four separate areas and within each area the product was sold at three different prices in different markets. Thus there were total 12 test markets. The data from the experiment is shown in the following table.

#### Data from the Test Markets

|                | Unit Sales in 000          |                             |                      |
|----------------|----------------------------|-----------------------------|----------------------|
|                | Regular<br>Price<br>Rs.325 | Reduced<br>Price<br>Rs. 315 | Discount<br>(Coupon) |
| Market M,N,O   | 11                         | 12                          | 13                   |
| Market P,Q, R  | 11                         | 14                          | 12                   |
| Market S, T, U | 9                          | 12                          | 9                    |
| Market W, X, Y | 8                          | 13                          | 10                   |

$$\text{Mean} \quad \bar{x}_1 = 9.75 \quad \bar{x}_2 = 12.75 \quad \bar{x}_3 = 11$$

$$\text{Grand Mean} \quad \bar{\bar{x}} = 11.17$$

### Solution

SS total is

$$\begin{aligned} & (11 - 11.17)^2 + (11 - 11.17)^2 + (9 - 11.17)^2 \\ & + (8 - 11.17)^2 + (12 - 11.17)^2 + (14 - 11.17)^2 \\ & + (12 - 11.17)^2 + (13 - 11.17)^2 + (13 - 11.17)^2 \\ & + (12 - 11.17)^2 + (9 - 11.17)^2 + (10 - 11.17)^2 \\ & = 37.67 \end{aligned}$$

SS within is found out by squaring the deviation of each score from its group mean and then summing them up. In our example:

$$\begin{aligned} \text{SS within} = & (11 - 9.75)^2 + (11 - 9.75)^2 + (9 - 9.75)^2 + (8 - 9.75)^2 \\ & + (12 - 12.75)^2 + (14 - 12.75)^2 + (12 - 12.75)^2 + (13 - 12.75)^2 \\ & + (13 - 11)^2 + (9 - 11)^2 + (10 - 11)^2 + (12 - 11)^2 + (14 - 11)^2 + (12 - 11)^2 \end{aligned}$$

$$= 19.56$$

SS between is obtained by squaring the deviation of each group mean from the grand mean, multiplying by n and summing them up. Thus in this example:

$$\begin{aligned} \text{SS between} &= 4(9.75 - 11.17)^2 + 4(12.75 - 11.17)^2 + 4(11 - 11.17)^2 \\ &= 18.17 \end{aligned}$$

Now we will find Mean Square between and Mean square within by dividing the respective SS by  $c - 1$  and  $cn - c$  degree of freedom respectively. Here are both calculations:

$$\text{MS between} = 18.17 / c - 1 = 18.17 / 2 = 9.08$$

$$\text{MS within} = 19.57 / cn - c = 19.57 / 9 = 2.17$$

Now we can find the F-ratio:

$$F = \text{MS between} / \text{MS within} = 9.08 / 2.17 = 4.178$$

We have found the F-ratio which is 4.178.

Let us compare it with table at  $(c - 1) = 2$  degree of freedom in the numerator and  $(cn - c) = 9$  degree of freedom in denominator in the F table. This is equal to 4.26 which is greater than the calculated value. Therefore we accept the null hypothesis.

■ **CONCLUSION:** It appears that there is no real difference of sales produced by different prices. All price treatments produce almost the same sales volume.

## Lecture #36

### ANOVA and Post Hoc Analysis

A marketing manager of a toy company wants to find out whether product location in the store, (front, middle and back) affects the sales of toys. Six stores are randomly selected for each location. Price, store size and display area for the product is constant for all stores. After one month of the experimental research period, the sales volume of each location in the stores was noted which is given in the following table. (In rs.00)

#### Required

Test at 0.05 level of significance whether there is an evidence of significant difference of sales volume among various locations. Which location appears to be different significantly in average sales?

### LOCATION

| Store # | Front | Middle | Back |
|---------|-------|--------|------|
| 1       | 86    | 46     | 33   |
| 2       | 72    | 60     | 24   |
| 3       | 54    | 40     | 20   |
| 4       | 62    | 28     | 14   |
| 5       | 50    | 22     | 18   |
| 6       | 40    | 28     | 16   |

Mean  $\bar{X}_1 = 60.67$

Mean  $\bar{X}_2 = 37.3$

Mean  $\bar{X}_3 = 20.83$

Grand Mean  $\bar{\bar{X}} = 39.61$

#### Solution

Null Hypothesis: Mean  $\bar{X}_1 = \text{Mean } \bar{X}_2 = \text{Mean } \bar{X}_3$

Alternate Hypothesis: All means are not equal.

The SS total is computed by squaring the deviation of each score from the grand mean and summing them up.

$$\begin{aligned}
 \text{SS Total} = & (86 - 39.61)^2 + (72 - 39.61)^2 + (54 - 39.61)^2 \\
 & + (62 - 39.61)^2 + (50 - 39.61)^2 + (40 - 39.61)^2 \\
 & + (46 - 39.61)^2 + (60 - 39.61)^2 + (40 - 39.61)^2 \\
 & + (28 - 39.61)^2 + (22 - 39.61)^2 + (28 - 39.61)^2 \\
 & + (33 - 39.61)^2 + (24 - 39.61)^2 + (20 - 39.61)^2 \\
 & + (14 - 39.61)^2 + (18 - 39.61)^2 + (16 - 39.61)^2 \\
 = & 7406.28
 \end{aligned}$$

SS Within is obtained by squaring the deviation of each score from its grouped mean and summing them up.

$$\begin{aligned}
 \text{SS within} = & (86 - 60.67)^2 + (72 - 60.67)^2 + (54 - 60.67)^2 \\
 & + (62 - 60.67)^2 + (50 - 60.67)^2 + (40 - 60.67)^2 \\
 & + (46 - 37.3)^2 + (60 - 46)^2 + (40 - 46)^2 \\
 & + (28 - 46)^2 + (22 - 46)^2 + (28 - 46)^2 \\
 & + (33 - 20.83)^2 + (24 - 20.83)^2 + (20 - 20.83)^2 \\
 & + (14 - 20.83)^2 + (18 - 20.83)^2 + (16 - 20.83)^2 \\
 = & 2599.51
 \end{aligned}$$

SS between is obtained by squaring the deviations of each group mean from the grand mean.

$$\begin{aligned}
 \text{SS between} = & 6(60.67 - 39.61)^2 + 6(37.3 - 39.61)^2 + 6(20.83 - 39.61)^2 \\
 = & 4809.29
 \end{aligned}$$

Mean Square between groups is found by dividing SS between by  $c - 1$

MS between is equal to  $\text{SS between} / c - 1 = 2404.64$

Mean square within will be found by dividing SS within by  $cn - c$

MS within is equal to  $\text{SS within} / cn - c = 173.30$

Finally F ratio is calculated by taking the ratio of mean square between groups to the mean square within the groups.

$F = \text{MS between} / \text{MS within}$

$F = 2404.64 / 173.30 = 13.88$

Now Let's find the critical value of F at the point 0.05 level of significance in the table. We need degree of freedom in numerator which is  $c-1$  is equal to 2 and degree of freedom in the denominator which is  $cn - c$  is equal to 15. The value of F at these degrees of freedom at .05 is 3.68, which is lesser than the calculated value (13.88). Hence Null Hypothesis is rejected. It means that there is evidence of significance difference in average sale among the various product locations in the store.

When we look at the table and we find that sales at the front location is different (greater) from the middle and from the back location.

## Multiple Comparisons

Once the differences in the means of groups have been established, it becomes important to determine means of which particular groups are significantly different from each other. We do it with the help of procedure called post hoc comparison. It is called post hoc because other hypotheses are formulated after the data have been inspected under one way ANOVA. The procedure follows these steps:

### Post hoc Analysis

1. Determine the number of comparisons by the formula  $c(c-1)/2$ .
2. Compute differences between various means.
3. Obtain critical range for this procedure
4. Compare each of the  $c(c-1)/2$  pair of means with the critical range. (Please note that critical range would remain same if the sample size in all pairs is equal. In case it is different, then critical range will be calculated for each pair of means).
5. If the absolute difference of pair of means is greater than the critical range, the difference between the pair of means is significant otherwise not.

Now let us go back to our previous example of location of toys in the store and perform the post hoc analysis. In that example we performed ANOVA test and rejected the null hypothesis that all sales on all locations are equal which meant that the means of three locations i.e. front, middle and back were not equal. Now to determine which pairs of means are significantly different from each other, we follow the steps of post hoc comparison as under:

Possible number of comparisons are  $c(c-1)/2$ , which is equal to  $3(3-1)/2 = 3$ .

Absolute mean differences are:

1.  $\bar{X}_1 - \bar{X}_2 = 60.67 - 37.3 = 23.37$
2.  $\bar{X}_1 - \bar{X}_3 = 60.67 - 20.83 = 39.84$
3.  $\bar{X}_2 - \bar{X}_3 = 37.3 - 20.83 = 16.47$

Obtain only one critical range because the three groups have the same sample size. The equation to obtain critical range is

$$\text{Critical Range} = Q_u \sqrt{\frac{\text{MSW}}{2} \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}$$

where Q is the upper-tail critical value from a studentized range distribution table with c degree of freedom in the numerator and cn-c degree of freedom in denominator.

$$\text{Critical Range} = Q_u \sqrt{\frac{\text{MSW}}{2} \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}$$

$$\text{Critical Range} = 3.67 \sqrt{\frac{173.30}{2} \left( \frac{1}{6} + \frac{1}{6} \right)}$$

$$\text{Critical Range} = \mathbf{19.63}$$

The degree of freedom in numerator is 3 and denominator is 18-3= 15. When we look the value of Qu in the table against these degrees of freedom; it is 3.67. Taking figures of MSW & n calculations from our previous example, and apply in the above equation; the critical range comes to;

As we notice above, the critical range is 19.63. When we compare absolute difference between different pair of means with critical range, we find that 23.37 > 19.63 and 39.84 > 19.63 but 16.47 < 19.63.

We therefore draw the conclusion that

1.  $\bar{X}_1 - \bar{X}_2 =$  is SIGNIFICANT
2.  $\bar{X}_1 - \bar{X}_3 =$  is SIGNIFICANT
3.  $\bar{X}_2 - \bar{X}_3 =$  is NOT SIGNIFICANT

## ***Lecture #37***

### **Regression Analysis**

Regression is the dependence of a variable on one or more variable. Regression analysis is primarily used for the prediction purpose. The goal of regression analysis is to develop a statistical model that can be used to predict the value of a dependent variable based on the value of the independent variable. The independent variable is also called as predictor or explanatory variable whereas dependent variable is also called criterion or response variable

#### **Regression and Correlation**

Regression analysis procedure is used to analyze associative relationship between a metric dependent variable and one or more independent variables. It shows whether relationship between criterion and predictor variable exists or not; that whether the independent variable explains a significant variation in the dependent variable. Secondly the value of dependent variable is predicted for a given value of independent variable.

Correlation in contrast to regression is used to measure strength and direction of association between two numerical variables. These variables may not necessarily have dependent-independent relationship. Secondly the objective in correlation analysis is not to use one variable to predict the other; it simply measures the strength of Covariation between two variables.

#### **Types of Regression Modes**

The nature of relationship between the dependent and independent variable can take many forms from simple to complicated mathematical functions. The simplest relationship is the straight line or linear relationship, where there is only one predictor (Independent) variable. This is called simple regression model or straight-line regression or simple linear regression or bivariate regression model.

If there are more than one independent variables, it is called multiple regression model.

#### **Simple Regression Model**

Construction of a regression model starts with the identification of the dependent variable and independent variable or variables.

**As stated already a simple regression model, is one in which, there is one independent variable and one dependent variable.**

Suppose X is the only independent variable whereas Y is the dependent variable. The simple linear regression model is

$$Y = a + bx$$

where 'a' is the intercept and 'b' is the slope. Slope means the amount of change in Y if there is a change of one unit in X.

Simple linear regression is concerned with finding on a scatter diagram a straight line that fits the data best. The best fit means that there is as small difference between Y (actual values) and  $\hat{y}$  (the predicted value). Thus for predicted values the equation would be

$$\hat{y} = a + bx$$

Which has two unknowns a & b and are called regression parameters or regression coefficients

A mathematical techniques called least square method, fits best in the observed data and is used to determine the regression parameters a & b. This is considered to be the best technique in simple linear regression model as it would result in the minimum sum of squared differences between the actual value of Y and predicted value of  $\hat{y}$ .

In order to apply this method, we must calculate quantities to determine a & b. These are

$$\frac{\bar{y}}{\bar{x}} = \text{mean of } X$$

$$= \text{mean of } Y$$

$$n = \text{the sample size}$$

$$\sum X = \text{the sum of } X \text{ values}$$

$$\sum Y = \text{the sum of } Y \text{ values}$$

$$\sum X^2 = \text{sum of squared } X \text{ values}$$

$$\sum XY = \text{sum of product of } X \text{ \& } Y$$

Then we use these calculations in the following formulas

$$y = a + bx \text{ when we estimate it is } \hat{y} = a + bx$$

Where  $\hat{y}$  is the estimate or predicted value of Y

The formula for calculating a and b is simple

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

$$= \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2}$$

$$a = \bar{y} - b\bar{x}$$

### Example

A manager of a soft drink company wishes to develop a method for allocating the delivery time (unloading of crates) on a particular route.

A sample of 15 customers was selected on the same route and the delivery time and number of crates delivered were measured. The results were as followed.

## Solution

| Customer #                               | No of crates | Delivery time in minutes |
|------------------------------------------|--------------|--------------------------|
| 1                                        | 51           | 32                       |
| 2                                        | 65           | 33                       |
| 3                                        | 72           | 35                       |
| 4                                        | 84           | 36                       |
| 5                                        | 104          | 40                       |
| 6                                        | 112          | 37                       |
| 7                                        | 140          | 43                       |
| 8                                        | 158          | 48                       |
| 9                                        | 160          | 42                       |
| 10                                       | 202          | 57                       |
| 11                                       | 216          | 56                       |
| 12                                       | 240          | 60                       |
| 13                                       | 267          | 61                       |
| 14                                       | 275          | 64                       |
| 15                                       | 286          | 66                       |
| $\Sigma$ = 2432                          |              | 710                      |
| $\bar{X} = 162.13 \quad \bar{y} = 47.33$ |              |                          |

**Required**

Use the least square method to find regression coefficients a and b.

State the regression equation.

Interpret a and b.

*Predict the delivery time for a customer receiving 150 crates of soft drink*

| Customer # | No of<br>crates | Delivery time<br>(minutes) |               |              | xy            |
|------------|-----------------|----------------------------|---------------|--------------|---------------|
| 1          | 51              | 32                         | 2601          | 1024         | 1632          |
| 2          | 65              | 33                         | 4225          | 1089         | 2145          |
| 3          | 72              | 35                         | 5184          | 1225         | 2520          |
| 4          | 84              | 36                         | 7056          | 1296         | 3024          |
| 5          | 104             | 40                         | 10816         | 1600         | 4160          |
| 6          | 112             | 37                         | 12544         | 1369         | 4144          |
| 7          | 140             | 43                         | 19600         | 1849         | 6020          |
| 8          | 158             | 48                         | 24964         | 2304         | 7584          |
| 9          | 160             | 42                         | 25600         | 1764         | 6720          |
| 10         | 202             | 57                         | 40804         | 3249         | 11514         |
| 11         | 216             | 56                         | 46656         | 3136         | 12096         |
| 12         | 240             | 60                         | 57600         | 3600         | 14400         |
| 13         | 267             | 61                         | 71289         | 3721         | 16287         |
| 14         | 275             | 64                         | 75625         | 4096         | 17600         |
| 15         | 286             | 66                         | 81796         | 4356         | 18876         |
| <b>Σ</b>   | <b>= 2432</b>   | <b>710</b>                 | <b>486360</b> | <b>35678</b> | <b>128722</b> |

|                                          |  |  |  |
|------------------------------------------|--|--|--|
| $\bar{X} = 162.13 \quad \bar{y} = 47.33$ |  |  |  |
|------------------------------------------|--|--|--|

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2}$$

$$= \frac{128722 - 15(162.13 \times 47.33)}{486360 - 15(162.13)^2}$$

$$= \frac{128722 - 115104}{486360 - 394292}$$

$$= \frac{13618}{92060}$$

$$= .1479$$

$$a = \bar{y} - b\bar{x}$$

$$= 47.33 - .1479 \times 162.13$$

$$= 47.33 - 23.98$$

$$= 23.35$$

Regression equation

$$\hat{y} = 23.35 + .1479x$$

Delivery time for 150 crates

$$\hat{y} = 23.35 + .1479 \times 150$$

$$= 23.35 + 22.19$$

$$= 45.53$$

**A company wants to check the sale of the washing machines as a function of expenditures on Research and Development (R &D). The data for the last 14 years are represented below.**

| District | Annual (R&D) Expenditure Rs.(00) | Annual sales Rs(000) |
|----------|----------------------------------|----------------------|
| 1        | 3008                             | 4085                 |
| 2        | 1726                             | 3681                 |
| 3        | 1642                             | 3895                 |
| 4        | 2816                             | 6653                 |
| 5        | 5555                             | 9543                 |
| 6        | 5841                             | 11760                |
| 7        | 1292                             | 3418                 |
| 8        | 2208                             | 5563                 |
| 9        | 1313                             | 3660                 |
| 10       | 4567                             | 7585                 |
| 11       | 1102                             | 2694                 |
| 12       | 5161                             | 10674                |
| 13       | 1516                             | 2898                 |

|           |             |             |
|-----------|-------------|-------------|
| <b>14</b> | <b>3151</b> | <b>5468</b> |
|-----------|-------------|-------------|

$$\bar{x} = 2921.28$$

$$\bar{y} = 5826.93$$

**Required**

Find the regression coefficients a and b.

State the regression equation.

What will be predicted sales if the R & D expenditures are Rs.50000

**Solution**

$$y^2$$

| $X^2$              |           | $xy$      |
|--------------------|-----------|-----------|
| 9048064            | 16687225  | 12287680  |
| 2979076            | 13549761  | 6353406   |
| 2696164            | 15171025  | 6395590   |
| 7929856            | 44262409  | 18734848  |
| 30858025           | 91068849  | 53011365  |
| 34117281           | 138297600 | 68690160  |
| 1669264            | 11682724  | 4416056   |
| 4875264            | 30946969  | 12283104  |
| 1723969            | 13395600  | 4805580   |
| 20857489           | 57532225  | 34640695  |
| 1214404            | 7257636   | 2968788   |
| 26635921           | 113934276 | 55088514  |
| 2298256            | 8398404   | 4393368   |
| 9928801            | 29899024  | 17229668  |
| $\Sigma=156831834$ | 592083727 | 301298822 |

$$\begin{aligned}
 b &= \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2} \\
 &= \frac{301298822 - 14(2921.28 \times 5826.93)}{156831834 - 14(2921.28)^2} \\
 &= \frac{301298822 - 238309317}{156831834 - 119474276} \\
 &= \frac{62989505}{37357558} \\
 &= 1.686
 \end{aligned}$$

$$a = \bar{y} - b\bar{x}$$

where  $b=1.686$

so,

$$\begin{aligned}
 a &= 5826.93 - 1.686 \times 2921.28 \\
 &= 5826.93 - 4925.28 \\
 &= 901.6
 \end{aligned}$$

Regression equation will be

$$\hat{y} = 901.6 + 1.686x$$

*If the (R&D) expenditures are Rs.50000, the predicted sales will be*

$$\begin{aligned} \hat{y} &= 901.6 + 1.686 \times 500 \\ &= 901.6 + 843 \\ &= 1744.6 \\ &= 1,744,600 \end{aligned}$$

*Thousand rupees*

## ***Lecture #38***

### **Report Writing**

#### **Research Report**

The report will represent the efforts of the research team, and if it is poorly written with lots of errors, the quality of the whole research may become suspicious. On the other hand, all aspects of a research report are done well; the credibility of the researcher will be high.

We know that marketing research is conducted to assist the marketing management to take marketing decisions and reduce the risk in decision making.

It should be remembered that research report is the only tangible output of a marketing research project. At the same time it is documentary evidence that the research was conducted and it becomes a historical record of the organization. As such due attention must be given to the preparation of the report.

#### **Importance of Research Report**

The final step in the research process is the preparation of a research report. This is the culminating activity in the research project and it can be very well, the most important part of the research process. Research report is the only part of the research project that the client will actually see. By definition, the purpose of the marketing research is to provide information that facilitates the decision making by the management unless this information is properly communicated, even the most carefully designed and well executed research project has a value equal to naught. There is an iron law of marketing research that **“people would rather live with a problem that they cannot solve than accept a solution they cannot understand.”** It simply means that main criteria to evaluate the research report is how well it communicates the findings of research to the reader.

#### **Writing the Report-Guidelines**

Here are some of the guidelines that you should follow in the preparation of the research report.

#### **Consider your Reader**

Before you start writing, carefully consider your audience who will read your report, usually marketing managers. You should paint a picture of your audience in mind. How much information does h/she already have? How much detail you should provide him/her to take decision. How much technical knowledge the reader has? To what extent you can use technical terms.

### **Avoid Technical Jargon**

It is generally recommended that we should avoid technical jargon while writing a research report. The reason is simple; we may have more than one reader and if principal reader or some of the audience may know the meaning of the technical terms, some of the readers may not. Thus it is better to use descriptive explanations. If it is necessary to use some or many technical terms, define these terms for your reader preferably in a glossary or appendix.

### **Logical Organization**

The report should be structured logically so that it is easy to follow. Logical structure should be visible, especially in the body of the report. This makes the parts of the report coherent and clarity is enhanced.

### **Use Headings & Subheadings**

Report may be divided into headings and subheadings for the topics and subtopics respectively. Topic may be a main idea of each section. The headings and subheadings are signals or signposts of a map. Topics may be in the form of a single word, phrase, sentence or question; whatever fits the purpose of your report. However, there should be consistency in the format, font type and font size in different levels headings and subheadings throughout the report.

### **Be Objective**

Research is an objective and systematic method of collecting, analyzing and interpreting the data to assist marketing managers in their decision. This objectivity should be maintained when you are communicating the results as well. The report should accurately present the details (methodology, data analysis, results and conclusion) without regards to the expectations of the management or client. We should not change the findings to please the client. Factual results should be presented in the report no matter whether these results are seen favorably or unfavorably by the client or user of the research.

### **Follow all Principles of good Communication**

The report is meant to communicate the research findings. You must follow all principles of good communication while writing a research report. Some of these are reproduced below:

- Use simple language. Vocabulary should be easy. If a simple word is available instead of a hard one, use it e.g. use instead of utilize.
- Use strong action verb e.g. Investigate instead of “performing an investigation” and recommend instead of “making a recommendation.”
- Generally write in active instead of passive voice. e.g. “Asghar wrote a report.” instead of “The report was written by Asghar.”
- Eliminate unnecessary words. The report should be written to the point. Write ‘now’ instead of ‘at this point of time.’
- Add graphs and charts to enhance understanding. However the brevity should not sacrifice completeness.

■ Observe all seven Cs of communication i.e. completeness, conciseness, coherence, clarity, correctness, courtesy and consideration.

### **Professional Look**

The final report should give a professional look. It should be produced with good quality of paper, typing, margins, headings, subheadings and binding. Professional appearance of the report would speak about the professional work that has been carried out by the researcher

### **Format of the Report**

The format of the research report may vary with the purpose of the research, researcher's style or user's instructions. If the client or user of the research wants the research report in a specific format, follow his/her instructions. Unless there are specific instructions from the organization for which the research has been conducted, the following elements may be included to develop a format for the research report. These elements are generally included in the reports.

### **Front matter or Prefatory parts**

- Title page
- Letter of transmittal
- Letter of authorization
- Table of content
- Executive summary

### **Body or Textual Parts**

- Introduction
- Background of the problem
- Statement of the problem
- Research objectives
- Research Design and Methodology
- Type of research design
- Data collection from secondary sources
- Primary data collection
- Instrument of data collection
- Sampling techniques
- Fieldwork

### **Data Analysis**

- Results
- Limitations
- Conclusions and Recommendations

## References

### End matter or Supplementary parts

#### ■ Appendices

## ***Lecture #39***

### **Components of Research Report**

A research report has many components each of which is listed and briefly described below.

#### **PREFATORY PARTS OR FRONT MATTER**

##### **Title Page**

The title page includes the title of the report, name and address of the researcher and the organization conducting the research, the name of the client and the date research report is being submitted. The title should be concise, clear and crisp indicating the nature of the project.

##### **Transmittal Letter**

This part of a formal research report is usually developed at the end. The transmittal letter introduces the research report to the recipient of the report. And can draw attention to particular project characteristics, contractual obligations or noteworthy conclusions, and as such can generate interest in the subject matter of the report.

##### **Letter of Authorization**

A letter of authorization is a letter which was written by the client or person who wanted the research to be done to the researcher authorizing him to start research for the writer. A copy of the letter is enough to be included in the report.

##### **Table of Contents**

The table of contents lists major report topics and subtopics (sections, chapters, appendices etc.) and their beginning page numbers. It varies from being very detailed to consisting of general topic headings only. Usually the major headings and subheadings are included in the table of contents. The table of contents is followed by a list of tables, list of graphs, list of appendixes, and list of exhibits, if any, if the report is lengthy.

##### **Executive Summary**

The executive summary is an important part of the report, as this the only portion of the report that executives often read. The executive summary should be written after the rest of the report has been completed. An executive summary is a mini report within the report. It is not simply a brief of the report but it is a distillation of the research project outlining the methodology, major findings, and conclusions. An executive summary is a bottom-line report created for decision makers who have no time or desire to go into the project's technical details.

## **BODY—TEXTUAL PARTS**

### **Introduction**

To begin with the body of the report, an introduction to the research background, discussions with the client and possibly the industry expert to find the direction of doing research to solve this management problem. This part provides a clear statement of the research problem and objectives/questions/hypotheses of the research. After reading this section, one can understand the reason and rationale for conducting this study

### **Research Design and Methodology**

A complete understanding and evaluation of a project depends on the research methodology used. Methodology which ranges --from sampling frame and procedures, to mode of data collection, to research instrument, to techniques of data analysis employed—should be described adequately. Who collected data and how fieldwork was organized and monitored to ensure the quality of data collection is explained in this section. Secondary data collection methods and sources are also discussed in this section

### **Data Presentation**

This section may contain several chapters or subsections showing data analysis in the form of tables, description, graphs etc. Data analysis is quantitative, qualitative or both. This part of the body is critical for the research project as the ultimate results and conclusions of the report are based on data analysis.

### **Results**

- As stated earlier, results may comprise several chapters or sub-sections. Most of the time, the results are presented both at the aggregate and the subgroup level, for example, market segment, market area, wholesale, retail level.
- Tables and graphs may highlight the results with the main findings discussed in the text.
- The results should be organized in a coherent and logical way.

The standard formats that are used to arrange data in the tables are:

- Alphabetically.
- Chronologically.
- Geographically.
- According to size
- According to interest of the reader.
- According to tradition.
- According to importance.

### **Conclusions and Recommendations**

This part of the report gives the main findings, conclusions and recommendations for the organization. A summary of the statistical findings is not enough. The researcher needs to discuss the results in light of the management problem being addressed to arrive at major conclusions. Based on the results, the researcher may give some suggestions to the decision makers. Sometimes

marketing researchers are not asked to recommend anything but confine themselves to giving their finding and conclusions.

### **Limitations**

After the conclusions and recommendations component of the research report, limitations of the research are mentioned. Limitations may originate due to time, budget or some other organizational constraints. No research project is without shortcomings. A researcher is ethically and professionally bound to fully disclose the shortcomings or setbacks of the research that may have an impact on its validity, reliability, or predictability. Sometimes limitations are given before the conclusions and recommendation section so that the readers should know the limitations of findings and conclusions.

### **Guidelines for Visuals**

In the research report, visuals may be used for enhancing the understanding of the report. Mostly these include tables, charts and graphs, maps, figures and flow charts. The guidelines for preparing and using these visuals are:

1. Make visual aids simple and convenient to understand.
2. Primary objective of including such visuals should be to augment the clarity and understanding of the content of the report.

### **End Matter or Supplementary Parts**

This is the section of the report which contains ‘too material’. It includes any material that the researcher thinks should also be included in the report to aid the understanding of the reader. It is in the form of appendixes which are labeled as Appendix A, B, C etc. and contain the headings as well. These appendixes may range from a blank copy of questionnaire to price lists, tables, diagrams, statistical illustrations, photographs etc.

### **General Guidelines**

- Type or print on one side only of heavy, white, unrolled paper
- Paper size: 8½ X 11 inches
- Double-space the entire paper
- Left justify text only
- Leave a minimum one-inch margin on the sides, top, and bottom of each page
- Number pages consecutively in the top right corner, beginning with the title page
- Just before the page number, use a shortened form of the title as a header
- Font size 12-point
- *Times Roman* or *Courier* are acceptable typefaces
- Only black toner
- Indent paragraphs 5-7 spaces
- No more than 27 lines of text per page

## ***Lecture #40***

### **Citation of References in Report**

Understanding citation protects the researcher from the offence of plagiarism. It helps in compiling Literature Review. Both instructors and students must be vigilant about citations.

#### **Various Style Manuals available in Market**

There are different manuals available to the research writers to learn and use citations in the research report. Some of them are mentioned below.

- APA – American Psychological Association
- MLA – Modern Language Association
- Chicago Style – Chicago Manual of Style
- Turabian Style – based on Chicago Style
- Harvard Referencing System
- ASA – American Sociological Association
- CBE - Council of Biology Editors
- APSA – American Political Science Association

Mostly the manual listed on number one is used in the marketing research projects. How various sources are cited in APA style is explained below with examples.

#### **APA Style Guide**

##### **Book with 1 to 2 authors**

##### **End Notes**

- John, L.G., & Spencer, L.J. (2004). Assessment of the Global Markets. White Plains, NY: Longman.

##### **In-Text**

- (John & Spencer, 2004, p. 11)
- (John & Spencer, 2004, p. 11-14) When material taken is on more than two pages

**Book with 3 to 5 authors****End Notes**

- Parkinson, A.R., Butcher, S.I., & Greenwood, A.G. (2001). Attitude towards service marketing. Hillsdale, NJ: Erlbaum.

**In-Text**

- (Parkinson, Butcher, & Greenwood, 2001) first citation
- (Parkinson et al., 2001) subsequent citations

**Edited book****End NOTES**

- Gibbs, J.T., & Huang, L.N. (Eds.). (1991). Selling in the children market. San Francisco: Jossey-Bass.

**In-Text**

- (Gibbs & Huang, 1991, p. 11)

**Chapter from a book****End Notes**

- Masaro, D. (1992). Broadening the domain of the fuzzy logical model of perception. In H.L. Pick, Jr., P. van den Broek, & D.C. Knill (Eds.), Cognition: Conceptual and methodological issues (pp. 51-84). Washington, DC: American Psychological Association.

**In-Text**

- (Masaro, 1992, p. 11-12) When information is available on more than two pages

**Journal article with 2 authors****End Notes**

- James, R., & Cramer, S. (2003). The hiring process in organizations. Consulting Psychology Journal: Practice and Research, 45(2), 10-36.

**In-Text**

- (*James & Cramer, 2003*)

**Journal article with 3 to 6 authors****End Notes**

- Kendall, P.C., Stark, K.D., & Adam, T. (1990). Cognitive deficit or cognitive distortion of childhood depression. *Journal of Abnormal Psychology*, 18, 255-270.

**In-Text**

- (Kendall, Stark, & Adam, 1990) first citation
- (Kendall et al., 1990) subsequent citations

**Newspaper article with no author****End Notes**

- New medicine seems to sharply reduce the risk of death from heart attack. (1999, August 25). *The Washington Post*, p. A12.

**In-Text**

- ("New Medicine," 1999)

**Magazine Article****End Notes**

- Steiner, M.I. (2006, October 9). Measuring the mind. *Science*, 262, 113-114.

**In-Text**

- (Steiner, 2006)

**Electronic book retrieved from database****End Notes**

- Naraynswamy, R. M. (2008). **Fundamentals of social research (5th ed.)**. Retrieved from **STAT! Ref database**

**In-Text**

- (Narayanswamy, 2008)

**Document on university program or department Web site****End Notes**

- Trapp, Y. U. (2005). Multiple intelligences: The learning process in our students. Retrieved July 1, 2006, from Yale University, Yale-New Haven Teachers Institute Web site: <http://www.yale.edu/ynhti/curriculum/units/2001/6/01.06.10.x.html>

**In-Text**

- (Trapp, 2005, para. 11)

**Electronic journal article with 1 to 2 authors, retrieved from database****End Notes**

- Shoemaker J. I and Bradman S. W: A model for the study of celebrity preference in youth. Journal of Consumer Behaviour, 20(4), 580-588. doi:10.1177/0269881105058776.

**In-Text**

- (Shoemaker & Bradman, 2006)

**Electronic journal article, 3-5 authors, retrieved from database, without DOI****End Notes**

- Tang, P., Yuan, W., & Tseng, H. (2005). Clinical follow-up study on diabetes patients participating in a health management plan. Journal of Nursing Research, 13(4), 253-261. Retrieved from CINAHL database.

**In-Text**

- (Tang, Yuan, & Tseng, 2005)first citation
- (Tang et al., 2005) subsequent citations

**Electronic journal article with 1 to 2 authors, freely available, without DOI****End Notes**

■ Munch, T. J., & Barrete, N. S. (2001). Emotional intelligence, self-esteem and parental love. E-Journal of Psychology and consumer behavior, 2(2), 38-48. Retrieved

■ from <http://ojs.lib.swin.edu.au/index.php/ejap/article/view/71/100>

**In-Text**

■ (Munch & Barrete, 2006, para. 12)

**Abstract****End Notes**

■ Mehjabeen, A., & Fatima, N. (2002). Effects of consumer perceptions in supermarket organization development. Journal of Social Psychology, 21, 96-111. [Abstract] Psychological Abstracts, 2002, 68, Abstract No. 1122

**In-Text**

■ (Mehjabee & Fatima, 2002, p. 1)

**Video Tape****End Notes**

■ National Institute of Medical Sciences. (2008). Drug abuse [videotape]. Islamabad

**Formatting****Reference List Order**

- Place the list of references cited at the end of the paper
- Start references on a new page
- Begin each entry flush with the left margin
- Indent subsequent lines five to seven spaces (hanging indent)
- Double space both within and between entries

- Italicize the title of books, magazines, *etc.*
- Arrange sources alphabetically beginning with author's last name
- If author has more than one source, arrange entries by year, earliest first
- When an author appears both as a sole author and, in another citation as the first author of a group, list the one author entries first
- If no author given, begin entry with the title and alphabetize without counting a, an, or the

Do not underline, italicize or use quote marks for titles used instead of an author name

### **Capitalization in Reference List**

- Capitalize only the first word of the title, the first word after a colon or dash, and proper nouns in titles of books, articles, *etc.*
- Capitalize all major words and all words of four letters or more in periodical titles.

### **How to Make a Quotations**

- When fewer than 40 words
- Put prose quotations in running text
- Put quote marks around quoted material
- Author's last name, publication year, and page number(s) of quote must appear in the text

#### **■ Example 1**

- Herman (1996) states that a traumatic response frequently entails a “delayed, uncontrolled repetitive appearance of hallucinations and other intrusive phenomena” (p. 11).

#### **Example 2**

- A traumatic response frequently entails a “delayed, uncontrolled repetitive appearance of hallucinations and other intrusive phenomena” (Herman, 1996, p. 11).

### **Long Quotations**

- When 40 words or more
- In block form

- Indent 5-7 spaces and omit the quotation marks. If the quotation has internal paragraphs, indent the internal paragraphs a further 5-7 spaces
- Do not use quotation marks
- Double space the block quote
- Cite the source after the end punctuation of the quote

### **Block Quotations**

- Meile (1993) found the following:
  - The “placebo effect,” which had been verified in previous studies, disappeared when behaviors were studied in this manner. Furthermore, the behaviors were never exhibited again, even when real drugs were administered. Earlier studies were clearly premature in attributing the results to a placebo effect. (p. 276)

## ***Lecture #41***

### **Presentation of Reports**

Sometimes it is desirable or mandatory for a researcher to present the project results orally to the client or their management.

One strategy that the consultant researcher follows is that initially distribute a written research report, then follow this written report with an oral presentation. It allows the intended audience to become familiar with the research project and they will be better able to discuss with the researcher any questions they may have about the methodology, findings or data of the research contained in the report.

#### **Oral Presentations**

Moreover many clients make their first impressions about the quality of the research project on the basis of oral presentation the researcher give to them, this activity becomes more important for a researcher. Basically an oral presentation is the executive overview and as such no attempt be made to communicate all details of research in an oral presentation. Decision makers may not be interested in the technical details, just the jest of everything

#### **Preparing a Presentation**

6. Key to successful presentation is preparation.
7. You should be prepared to answer any question that the audience may raise about the research process or results.
8. Extensive rehearsals are recommended.
9. It is also desirable that the presenter prepares a detailed outline for his/her assistance.

#### **Prepare Visual Aids for Presentation**

Prepare visual aids as they greatly enhance the value of oral communication in the following ways:

- f. Visual aids provide a framework for discussion.
- g. Numerical data are better understood in visual rather than in verbal form. That's why tables and graphs are used.
- h. Significant points can easily be emphasized by means of visual aids. For example if the researcher wants to indicate that access to the parking lot of a departmental store is a problem, he can show it with a diagram or a picture. Similarly those ideas which are complex and difficult to communicate otherwise can easily be illustrated with the help of visual aids
- i. Finally, they provide variety to the presentation.
- j. Visual aid can help refer back to critical points for discussion. Various kinds of visual aids include transparencies, charts, handouts, slides, videotapes, films, samples etc.
- k. Videotapes are particularly effective in presenting the proceedings of focus groups and other aspects of fieldwork that are dynamic in nature. Color transparencies can be prepared.
- l. PowerPoint and other software are easily available for making visuals for presentation

#### **Use of Visual Aids**

However it should be remembered that visual aids should not dominate the presentation. The researcher should remain the center of attention for the audience. Nobody should depend on visual aids to the extent that the presentation stops if the equipment for visual aids fails (for example, electricity breaks down during the presentation but there is no generator arrangements).

### **Body Language in Presentation**

- p. 'What to say' is important in a presentation but 'how to say' is more important. 'How to say' distinguishes a mediocre communicator from an outstanding communicator. Body language is to be effectively used in presenting the research report. Body gestures clarify verbal communication.
- q. The personal mannerisms of a researcher can either help or hinder an oral presentation. A researcher with good oral communication skills and no offensive mannerisms is considered more effective than the one who has good oral communication skills but offensive mannerisms.
- r. Avoid distracting the audience by fidgeting with the key ring or pen etc. Take everything out of your pockets and make sure there is nothing on the dices other than your notes. Remove pens, keys, clips—everything

### **Guidelines for Preparing and Delivering Effective Presentation**

For your guidance, some guidelines are provided for the preparation and delivery of an effective oral presentation.

#### **Before the Presentation:**

- 8. Write an outline of the presentation
- 9. Prepare necessary visual aids
- 10. Check all equipment.
- 11. Have a contingency plan in case the visual aid equipment fails.
- 12. Analyze your audience in terms of their reaction to research findings. Will they agree, be hostile or indifferent. It is better to begin the presentation with ideas to which you anticipate that the audience would most likely agree.
- 13. Practice the presentation many times. Possibly you would like to have someone witness your presentation and comment how to improve its effectiveness.

#### **During Presentation**

- 5. Start the presentation with an overview and then go into details.
- 6. Face the audience at all times. Maintain eye contact.
- 7. Talk to audience rather than reading excessively from a script or a script on screen.
- 8. Use visual aids effectively. These should really aid the presenter.
- 9. Avoid distracting mannerisms including unnecessary movement. Make sure your movements have some purpose.

10. Be concerned with your voice. It should not be too soft, loud, fast, slow, or monotonous. Use pauses to allow the audience some time to digest material.
11. Involve the audience.

**After Presentation:**

You have completed the presentation; ask the audience if they have any questions. Question-answer session is an interesting and important part of the presentation. This often concludes the talk, but audience can be permitted to ask questions during the presentation. Pause and make sure that the question is understood: then, if possible, give as compact response as possible.

You should

- Anticipate questions beforehand.
- Take the questions seriously.

**Question – Answer Session**

During the question – answer period you should:

- g. Concentrate on the question.
- h. Pause and repeat the question. It will allow you to think about the answer.
- i. Don't fake an answer. If you don't know the answer, say so.
- j. Answer questions concisely but support your answers with as much evidence as possible

## ***Lecture #42***

### **Demand Forecasting**

Frequently marketing researchers are requested to estimate the current market and sales potential for a new or existing product. This information is essential to configure sales territories, assign sales quotas, determine number of salespersons needed and their compensation level, appropriate advertising and sales promotion budgets, finding new prospect accounts, dropping slow products, and making new product decisions.

Sales or demand potential for new or established products can be estimated.

#### **Importance of Forecasting**

The forecasting of sales or demand is a critical input to marketing decisions and making decisions in other functional areas like production, finance, and human resources. Poor forecasting would result in excessive inventory, inefficient sales expenses, heavy discounts, lost sales, inefficient scheduling of production, and poor planning for cash flow and capital investments. We should understand that forecasting provides the basis of almost all planning and control. If the forecasts are unreliable, it is most difficult to make the right tactical or strategic decision.

#### **Accuracy of Sales Forecasts**

Sales forecasting comprises of numerical estimates and these are just estimates and are never absolutely correct, that is the numerical estimates always differ from actual sales results. This can be established only after the sales have been recorded. As such, there is no direct measure of forecasting accuracy before the forecasting period. Therefore the tactics to be closer to accurate forecasting are that we, as good researchers, should

Choose systematic and objective procedures and employ them adequately; and Select valid data sources that yield information on time and in adequate detail.

#### **Methods of Forecasting**

There is a variety of approaches that can be used for forecasting. These are classified as Qualitative and Quantitative.

■ **Quantitative methods may further be sub divided into Time Series Extrapolation and Causal Models.**

### **List of Forecasting Methods**

#### **Qualitative Methods**

- Jury of executive judgment
- Sales force estimates
- Survey of customer intentions
- Delphi

**Time-Series Extrapolation**

- Trend projection
- Moving average
- Seasonal and cyclical index

**Causal Models**

- Leading indicators
- Regression models

**Qualitative Methods**

These methods are based on the subjective judgments of various individuals in the situation although these individuals may have access to quantitative information about the past to aid their estimates. These individuals may get an opportunity to revise and refine their estimates but still the estimates are subjective.

Let us examine these methods one by one in detail.

**Jury of executive judgment**

This method involves combining the judgment of a group of managers on the issue of forecast. A variety of concerned and informed managers representing such functional areas as marketing, sales, operations, manufacturing, purchasing, accounting, and finance are invited, combined on one place and asked to give their sales estimates for the next specified period. The estimates are consolidated and may be averaged or range is determined. This method is widely used in forecasting but it is mostly used to estimate the potential of consumer products and sales of service companies.

**Advantages and Disadvantages*****Advantages include,***

- It is fast and efficient
- It is quite timely as the forecast is generated by the executives who have most current information.
- Forecast is based on collective knowledge and experience of the managers and as such the judgment is very close to the real situation

The main disadvantage is the subjectivity of the executives.

**Sales force Estimates**

This method is based on the judgments of the sales force which is actually working in the field. Each sales person is asked to give his estimate of sales in his territory for the next period. All estimates are added and this gives a total of sales potential in all territories for the next period. Then these estimates are fine-tuned by the sales supervisors and estimates are finalized.

As the forecasts from the sales force are drawn on the complete, sensitive and current knowledge of the customer and market, these estimates are very close to the actual. Although these are subjective judgments but based on rich experience of the sales force

The disadvantages of this method include that individual salespeople can be naturally optimistic or pessimistic. There is another serious bias to occur when the forecast is linked to the performance measure of salesperson. In that the salesperson would intentionally underestimate the potential of his territory so that fewer quotas are assigned to him and he can easily achieve it at the end of the period and receives appreciation and/or any incentive attached.

The sales force estimate approach is mostly used in industrial organizations.

### **Survey of customer intentions**

In this method, customers are requested to make their own forecasts about how much of this product they intend to buy and use in the next period. The sales forecast, in turn, is worked out on the basis of their buying intentions.

Sampling frame is usually the existing customer or client list, As the bulk of sales or demand usually comes from existing customers, the sample of customers to survey the buying intentions is taken from the existing customers. The right person in the customer organization must be contacted

The survey of customer buying intentions works best when the number of customers, or at least the major customers, is small. As such, the maximum use of this technique is made in industrial organizations.

As compared to Jury of Executive Judgment or Sales force Estimate methods, Survey of Buying Intention is more expensive and time consuming.

### **Delphi Approach**

Delphi Approach is somehow an extension of jury of executive judgment method to refine the forecasting process. In Delphi approach, group members are asked to make individual judgments about the forecast. Then these judgments are compiled and the whole package is returned to each member, so that he/she can compare his/her own estimate with those of the other members. In this exercise, the names are obscured, and codes are given instead so that the personalities or positions of some members in the group do not bias the opinion of other members.

The members are asked to revise their estimates in the light of others' judgments, and if they differ from others, state the reason why they believe that their estimates are correct. They return the package to the coordinator who is conducting this session and serves as a clearing house. The coordinator forwards the revised estimates with comments of each member to other members. It means everybody is receiving everybody's comments.

This process is repeated three or four times and the group usually reach to the final forecast of sales.

### **Quantitative Methods Time-Series Analysis**

Time series analysis is simply the extrapolation of historical data in the next period. Statistical formulas are used to extrapolate the data in the future.

Three factors are prerequisite for time-series extrapolation and must be understood clearly.

- Data must exist in time series
- Environmental change influencing the time series can make the extrapolation err, little ability to forecast “turning points”
- Detection of patterns or trends in the past data must be possible.

### Causal Models

Causal Models involve statistical techniques that relate historical sales data to the economic factors or forces that become the cause to increase or decrease the sales. These methods are indeed the most sophisticated sales forecasting tools. They prove to be very correct when relevant historical data on major forces causing changes in sales are available. Two methods are mostly used in the Causal Models: Leading Indicators and Regression

#### Leading Indicators

This approach involves the identification of leading indicators which become the cause of the variation in sales of a good or service. These factors can move the sales of a particular good or service up or down. For example

- Urbanization may lead to new housing
- New housing lead major appliances sales
- Number of births leads the sale of infant-related goods and services

### Regression Models

We have already studied simple Regression model in which independent variable/s are identified and their values are input into the model to forecast the sale for a particular period or year. You may recall simple regression model which is

$$\text{Sales Forecast} = Y = a + bX$$

Multiple Regression Model is

$$\text{Sales Forecast} = Y = a + b_1X_1 + b_2X_2 + b_3X_3$$

## ***Lecture #43***

### **New Product Research**

Innovation and consequently development of new products is critical to the life of almost all business firms as they have to adapt to their changing environment. Some uncertainty is associated with the new products as, by definition, new products contain aspects with which the organization will not be unfamiliar. Thus, a good proportion of marketing research is directed toward reducing the risk involved in the introduction of new products. A marketing manager needs the support and confirmation from market researcher at various stages of new product development.

#### **Stages in New Product Development**

We know that following are the stages in the development of a new product:

- Idea generation
- Idea screening
- Concept development and testing
- Business analysis
- Product development and laboratory testing
- Testing marketing or field testing
- Commercialization

Marketing research may not be needed in all of these stages but is definitely required in stage 1, 3, and 6. The specific techniques that are used are in different stages are different.

Let us see what those stages are where we use marketing research effectively. This is shown in the next figure.

#### **Idea Generation**

The objective of idea generation research is to come up with completely new ideas for products, or new attributes for current products, or new use for current products.

Ideas may come from different sources through various company personnel, for example salespersons, dealers, maintenance people and customer service personnel. All of these have direct contact with the customers who are good source of ideas about the new products. The market researcher can rely on the opinions of such personnel or may plan to accompany these people and listen to their ideas and subsequently refine them.

## Focus Groups

Another method which is used extensively in idea generation for new products is consumer focus group.

As many focus groups as the time permits are used in this research primarily as brainstorming sessions. The objective is to generate as many ideas as possible without being critical.

In the focus-group interviews, another approach termed benefit structure analysis can also be used. In that the product users identify the benefits desired and the extent to which the product delivers those benefits. The result is an identification of benefits sought which current products are not delivering, hence the need of new product or innovating the existing product. The researcher should seek new dimensions of consumer perception about the established products in the research. The problems associated with product-use situations will come to the surface in such focus groups.

In focus groups, social and environmental trends can also be analyzed. For example if there is a trend of using natural foods, it might suggest that biscuits filled with fruits might be a good option.

Perceptual Maps are prepared by the researcher. On these maps the researcher positions various products/brands in the market along the dimensions which users perceive critical and evaluate. Eventually a perceptual map can suggest gaps where new products might fit.

## Concept Development and Evaluation

Concept development and testing is another stage where research is required.

What is a concept? Is it different from idea? Yes. A concept is fully developed and elaborated idea.

First the researcher translates the idea into a perceivable concept. For example a product concept is formed by the researcher which includes major attributes of the new product, relative advantage over the products currently available in the market, tentative price, packaging, advertising approach, and a suggested name. As there is no tangible usable product at this point of time that can be tested, the concept should be developed and defined well enough so that it is clearly communicable. There may be simply a verbal description, or it may be accompanied with the three dimensional models and other possible visuals. At some point it is important for the concept to include other three Ps of the marketing program that will support it including its price, its name, its advertising position, and even the type of store in which it is sold. Then questions are asked from the respondents to test the concept.

## Methodology of Concept Testing

As the nature of most concepts testing is exploratory, focus group interviews is the most frequently used technique for concept testing.

Usually the discussion in the focus groups centers around testing of one concept but some times a paired comparison technique is used when the objective is to test alternate concepts.

In that, each respondent tests a set of product concepts two at a time and states which of the two is preferred. However, in a paired-comparison test, as the respondents have to select one product over another, they may do so using a very trivial attribute.

### **Concept Test Group**

The respondents for concept testing normally include the people who would be among the target segments. The aim of concept testing is to determine if a viable market exists; and therefore, no potential segment should be ignored for this study. Generally, the concept is exposed to the respondents for testing through personal mode, in some central location like shopping mall or some facility available with the researcher in or outside his organization.

Again for concept testing, focus group techniques can be used effectively in which there will be free discussion with a moderator to yield valuable data about the concept evaluation.

### **Objectives of Concept Testing**

The main purpose of a concept testing is to help refine the product features, determine how it should be positioned, and suggest something about different components of marketing mix. Such a test is an overall indication of attitudes, interest and likelihood of purchase by the target segment. Objectives of concept testing may be outlined as below:

- To get a first-hand reaction of potential consumers' views of the product idea
- To select the most promising concepts for further development
- To get an initial evaluation of commercialization of the newly developed product, if it happens

### **Concept Testing Questions**

Since concept testing requires diagnostic information, the questions can be posed to the respondents which would help determine:

- Whether the respondents comprehend the product or not?
- How do the respondents perceive the attributes of the new product?
- What possibly are the advantages and disadvantages of the intended product?
- Segments/situations in which the product can be used and how frequently
- What alternative concepts would be preferred?
- Does the concept have a crucial flaw?

## Test Marketing or Field Testing

In concept testing, we test only an imaginary product but in test marketing, we test an actual tangible product after it has been developed. As we have already studied, test marketing or market testing is a controlled experiment, done in a limited but carefully selected part of the marketplace, and where the aim is to predict the sales or profit consequences, either in absolute or relative terms, of one or more proposed marketing actions. Here the focus of testing would be the acceptability of the newly developed product.

### ■ *Testing marketing has two objectives:*

- Prediction of sales and
- Managerial control

### Test Marketing as a Managerial Control Tool

1. We could gain experience in physically handling the product---shelf life, breakage, storage, shipping, and so on. We could identify costly mistakes and thereby avoid them on a national basis
  - The cans of cherry topping began exploding
2. We could learn the difficulties of gaining distribution, of producing a new commercial, of making our price hold at retail, and so on. This experience would be used later in our national rollout.

### Test Marketing as a Predictive Research Tool

To find out the potential sales of a new product, we select a test area, run the test for desired period of time and from the sales in the test area and other statistics which may be made available, the prediction about the sales of the country as a whole (or entire market if it is different from the country) can be made by the following two methods.

#### 1. Buying Income Method

In this method, the sales of the test product/brand are expanded by the ratio of the test area's buying income to the buying income of the country. This formula is used

|                          |   |                                                                 |   |                 |
|--------------------------|---|-----------------------------------------------------------------|---|-----------------|
| Country's Sales Estimate | = | $\frac{\text{Total Country's income}}{\text{Test area income}}$ | X | Test area sales |
|--------------------------|---|-----------------------------------------------------------------|---|-----------------|

## 2. The Share-of-Market Method

In this method, sales of the test brand is worked out by relating to sales of the product category including all brands as whole in the area where the new brand is being tested. This formula is used:

|                                   |  |                                                      |   |                                                      |
|-----------------------------------|--|------------------------------------------------------|---|------------------------------------------------------|
| <i>Country's Sales Estimate</i> = |  | <i>Test area sales of the new brand</i>              | X | <i>Country's sales of the whole product category</i> |
|                                   |  | <i>Test area sales of the whole product category</i> |   |                                                      |

### Problems of Test Marketing

- Salespersons in the selected area are simulated beyond normal activity
- Special introductory offers and promotions are often made to the trade and to consumers because it is so important to get and maintain distribution during the test to measure repurchase activity. Their offers are then not available at the scale of the test for a national rollout.
- Competitors can attempt to destroy your ability to make judgments from a test by increasing their efforts in your test cities out of proportion with their national efforts.
- Measurements accuracy can yield ambiguous data. Auditing store sales can often give inaccurate data because of poor store records or incomplete knowledge of the store's billing and handling systems.
- Competitors may use your test market to learn of your activities and monitor your results.

## ***Lecture #44***

### **Advertising Research**

One of the major applications of marketing research is in advertising and promotion. More than half of the big companies get some form of advertising research done.

Various aspects of advertising, including media audiences and the effectiveness of message of advertisement become the subjects of marketing research. These two areas namely media and message are mainstay of advertising research.

#### **Media Research**

Media research is an important topic within the area of marketing research. Selection of media for advertisement is one major decision that the marketing manager has to take and advertising research ultimately helps the company to select media to use in the advertising plan. Choices have to make between various media types e.g. television versus radio versus newspapers and so forth; and not only this but decision must be made about which specific newspaper, or television channel or even program within the channel. In turn the selection of media would depend on many questions that the advertising research would attempt to answer. As such media research would probe these questions:

**Media Vehicle Distribution:** How many numbers of television sets or radio set or magazines or newspapers that carry the advertisement.

**Media Audience:** How many people watch TV, or listens to the radio programs or read the newspaper or magazines in which ad has been inserted? Obviously media audience is more than the distribution of media vehicles as only one person is not exposed to one media vehicle. More than one person watches a television or reads a magazine.

**Exposure to Advertisement:** People may be exposed to a medium but may not notice a specific advertisement. Marketing research tries to find out how many people were actually exposed and noticed the advertisement in the media. This number is definitely less than media audience.

**Advertising Perception:** Who, among those who noticed the advertisement, correctly perceived and comprehended the message of the advertisement in question.

**Sales Response:** How many of the persons who were exposed to, noticed and comprehended the ad properly, purchased the product in response to the ad.

#### **Media Vehicle Distribution**

Data on some media vehicle distribution are the most readily available from different sources and are not disputed as to their accuracy. Advertisement research uses of these sources frequently; For example

- Audit Bureau of Circulation (ABC) for newspapers
- Newspapers and magazines have their own reports.
- Data about the sales of radio and television sets from the markets.
- Government agencies surveys about television users.
- In fact for the broadcast media the measurement of vehicle distribution is much less important as compared to the media audience.

### **Media Audiences**

The media audience is the number of people actually exposed to the vehicle at least once.

#### **Newspapers Readers**

A newspaper reader is one who claims to have read at least apart of the newspaper in question on a given day.

Newspapers themselves sometimes collect readers' data and the advertisers rely on these data.

#### **Televisions Viewers**

In advertising research, the television viewer ship can be found out by the following methods.

##### **Diary**

##### **Meters**

##### **Personal Interview Recall**

In the diary method household viewers are requested by the researcher to record the name of the shows that they watched and mail the diary back to the researcher. The researcher can break down the audience estimates by age, sex, and geographical area from diaries.

##### **Audi meter**

This device is connected electronically to a computer and records when the television is tuned to, if anything was being watched. To avoid self-consciousness, the meter is placed out of view. But it would not indicate the number of people watching a given television set. The audimeter provides an objective measure of televisions viewer activity with no burdensome recordkeeping

##### **People meter**

This is the remedy of the audimeter as to its disadvantage of not indicating the number of people watching the television. People meter allows each member of the family to "log on" and "log off" his or her television viewing time.

##### **Coincident telephone recalls method**

In method a sample of households is telephoned and asked what show is being watched at that time, if any, and also asked to identify the sponsor or product being advertised.

**Personal interview recall method**

This method involves interviewing a sample of respondents at homes shortly after the program of interest, most probably the prime time of shows on the television.

**Radio Audience**

No formal or syndicated sources are available, and the advertising researcher may rely on information collected by the media itself.

**Copy Testing**

The term “copy testing” is used to refer to test the effectiveness all aspects i.e. color, graphics, pictures, action, and so on, of ads. It involves exposing an audience to the advertisement and observing their response

A lot of time and effort is spent by the advertisers on copy testing.

Copy testing is done at different stages of its development: as a written concept, a set of drawings, an animated version, or a finished advertisement. It may be tested before or after running on the media. These are called Pretests and Posttests. Final version test is ideal as this is what people will be reacting.

**Ad Testing Procedures**

- Consumer Jury
- Physiological Methods
- Inquiry Tests
- On-the-air Tests
- Trailer Tests
- Sales Tests

**Consumer Jury**

■ In the consumer jury procedure, 50 to 100 consumers from the target audience are interviewed either individually or in small groups.

**■ Physiological Methods**

■ Some devices are used by the researcher to record the different physiological movements of the viewers and some inferences are drawn to be used in research.

Such devices measure the physiological arousal that is normally uncontrollable by the respondent. Skin resistance, heart beat, facial expressions, muscle movement, and voice pitch are analyzed. Some of these devices are described as under.

**Eye camera:** This camera tracks the movement of the eye as it watches an ad. This determine which section/s caught and hold attention and layout of the ad can accord be modified. In print ad it can be found out where the eye focused more time in each second. An analysis can determine what the reader saw, what he or she “returned to” for reexamination, what point was “fixed on” etc.

**Galvanic skin response (GSR):** It measures response to skin by attaching electrodes from a recording device to respondents, when exposed to ads.

Tachistoscope is another physiologically related testing device which measures the rate at which an ad conveys information or recognition.

**Brain-wave analysis:** In this analysis the audience is exposed to the advertisement and attention, interest, or emotional reaction to the advertisement can be assessed through wave analysis. The higher the wave amplitude, the more the brain activity is at that point in the advertisement. Brain wave analysis take place in a laboratory setting

### **Inquiry Tests**

Inquiry tests measure the effectiveness of an ad the on the basis of consumer inquiries that result directly from the ad placed mostly in newspapers or magazines. It provides a direct measure of response with no interview, reducing costs and artificial reactions due to the interviewing process.

### **On-the-Air Tests**

It involve about interviewing more than 100 respondents who may be contacted by telephone in any of big cities and who claim that they watched a particular television show the night before.

They are asked what they remember about the specific ad. What were the sale points in the ad and whether they had any favorable attitude in towards the ad or not.

This method is mostly used in television copy testing although does have some critics.

### **Trailer Tests**

This method is mostly used in the advanced countries like USA. The respondents are chosen from the shopping malls and are taken to a trailer near the mall or even a room in the mall itself. There they are shown several ads with or without surrounding programming, and different questions are asked about the ads including the recall test.

### **Sales Tests**

In standard advertising tracking, the respondents with the target market profile are interviewed, personally or by telephone, to measure their levels of awareness, attitudes about the ad and the brand, and recent purchases after watching being exposed to the ad.

### **Criteria**

Criteria of a good advertisement message are:

#### **■ Advertisement recognition**

Logically, recognition is a necessary condition for effective advertising. If the advertisement cannot pass this minimal test it probably will not be effective

#### **■ Recall of its contents**

#### **■ How does it persuade?**

#### **■ Impact on purchase behavior i.e. purchase**

### **Focus group in advertising Research**

Focus-group research is widely used in the development of an advertising campaign. Focus groups are mainly used to generate ideas for advertisements and to test reactions to rough executions. Opinions about the advertisement concepts and actual advertisements are sought. Audience impression within the group about what the ad was what ideas we presented, interest in the ideas, and so on. The goal is to detect potent misperceptions as well.

### **Sample Questions in Ad Research**

*Do you remember seeing this ad on TV?*

Yes                      No                      Not sure-I may have  
What did you see in it?

**How much interested are you in what this ad is trying to show you?**

Very interested                      to some extent                      not interested

*How does it make you feel about the product?*

It's a good product

It's Ok

It's bad

Not sure

**Please check whether this commercial was**

**Appealing**

**Clever**

Confusing

Convincing

Dull

Effective

Interesting

Irritating

## ***Lecture #45***

### **International Marketing Research**

#### **Need for International Marketing Research**

As we know that the international environment is getting more complex day by day and management of many domestic firms lacks familiarity with the foreign markets, it becomes all the more important to undertake research prior to making international marketing decisions and making marketing strategy.

This is equally important for decisions relating to initial market entry, product positioning, marketing mix or subsequent expansion decisions. Research will save us from costly mistakes in marketing and loss of valuable opportunities in international markets.

#### **Complexity of International Marketing Research**

Although the marketing research follows the same steps at the international level that the domestic marketing research has, yet the international marketing research is more complex than the market research in the domestic setting.

***For the sake of revision, let us list the six steps followed in the marketing research process.***

- ☐ Understanding the management dilemma
- ☐ Defining research problem and developing research objectives
- ☐ Formulating researching design
- ☐ Collecting data/Fieldwork
- ☐ Analyzing data
- ☐ Writing research report and oral presentation

## **Complexity of International Marketing**

Marketing on global scales poses problems that are inherently more complex than those encountered in a firm's domestic market.

Operations take place on a much broader scale and scope, often involving a range of different types of activities and management systems including licensing, strategic alliances and joint ventures.

International marketing entails operation in a variety of diverse environmental contexts. These range from the mature industrialized markets of Europe, the US and Japan, the unstable but blossoming markets of Latin America, the politically uncertain markets of the Middle East or Russia, and the volatile markets of South East Asia to the emerging African markets. International markets are also characterized by rapid rates of change in the technological, economic, social and political forces that shape their development.

Change is rapid and all pervasive, but as well as unpredictable, altering the nature of opportunities and threats in international markets.

Research aids in assessing where the best opportunities lie, where and how to enter new markets

## **Diversity of International Environment**

Diversity occurs particularly in relation to consumer tastes, preferences and behavior, and to a lesser extent, business-to-business markets.

The banking system, the structure of distribution adds a further level of complexity to strategy development and implementation. This, in turn, is further compounded by government regulation of business operations, product formulation and packaging, advertising, promotion, pricing as well as trade barriers such as tariffs, import quotas, etc

Level of literacy also varies from country to country. While levels of literacy in industrialize countries are typically 99%, it is important to remember that is far from the case in other countries.

## **Information Needs**

- Which markets and target segments will be entered?
- Which mode of entry and operation should be adopted for specific target markets?

- What should be the timing for entry
- How marketing resources must be allocated between different levels of marketing management (product/product line level, customer level and market segment/ country market level)
- How to establish a control system to monitor performance in the target market

### Information Needs

Information needs vary depending on the firm's experience and degree of involvement in international markets. In the initial phase of entry into international markets, information is needed to assess opportunities and risks in different countries.

### Issues in International Marketing Research

Complexity of Research Design and Difficulties in Establishing Comparability and Equivalence are two predominant issues in international marketing research. The relevant respondent may differ from country to country.

European countries, children play an important role in decisions related to the purchase of chocolate or cereals, in other countries which are less child oriented, the mother may be the relevant decision maker. Equally, the role of women is enhancing in financial and insurance decisions.

*In Arab society, this is rarely the case.*

Secondary data such as data on motor vehicle registrations may not provide equivalent data between many countries

### Survey Methods

- d. Telephone Interviewing
- e. In-Home Personal Interviews
- f. Mall Intercept
- g. Mail Questionnaires
- h. Electronic Surveys

### Telephone Interviewing and CATI

Telephone interviewing is the dominant mode of questionnaire administration.

Telephone (land line) penetration is still not complete in rural areas. In developing countries, only a few households have telephones. Telephone incidence is low in Africa. India is a predominantly rural society where the penetration of telephones is less than 10% of households in the villages.

With the decline of costs for international telephone calls, multi country studies can be conducted from a single location. This greatly reduces the time and costs.

### ***Cell phone penetration is high***

Computer-assisted telephone interviewing (CATI) facilities are well developed in the United States and Canada and in some European countries, such as Germany.

### **Mall Intercept**

In North America, many marketing research organizations have permanent facilities in malls, equipped with interviewing rooms, kitchens, observation areas, and other devices.

### **Mailed Questionnaires**

Because of low cost, mail interviews continue to be used in most developed countries where literacy is high and the postal system is well developed.

In Africa, Asia, and South America, however, the use of mail surveys and mail panels is low because of illiteracy and the large proportion of the population living in rural areas.

### **Electronic Surveys**

In the United States and Canada, the use of e-mail and the internet is growing by leaps and bounds.

Use of these methods for conducting survey is growing not only with business and institutional respondents, but also with households.

### **Questionnaire Translation**

■ The questions may have to be translated for administration in different cultures. Direct translation, in which a bilingual translator translates the questionnaire directly from a base language to the respondent's language, is frequently used

- Procedures such as back translation and parallel translation have been suggested to avoid these errors.
- In back translation, the questionnaire is translated from the base language by a bilingual speaker whose native language is the language into which the questionnaire is being translated. This version is then retranslated back into the original language.

Translation errors can then be identified.

1. An alternative procedure is parallel translation. A committee of translators translate the questionnaire simultaneously and the translations are compared to decide on the final version

| <b>Variable</b>       | <b>Importance</b>                                                                         | <b>Indicators</b>                                                                   |
|-----------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Economic</b>       | Measure of Economic Wealth, Macro level Indicator of Market Potential, etc.               | GNP, GNP per capita, Population, Inflation, Unemployment Rate, Interest Rates, etc. |
| <b>Political</b>      | Measure of Political Stability and Political Risk, Govt's Attitude towards business, etc. | Type of Govt, Expert ratings of political stability,                                |
| <b>Legal</b>          | Measure of legal risk, protectionism, marketing mix strategies, etc.                      | Import-Export laws, Tariffs, Non-tariff barriers, taxes, copyright laws, etc        |
| <b>Socio-Cultural</b> | Measure of High/Low Context Cultures, Attitude of people, Differences in lifestyles       | Religion, language, literacy, values, work ethics, role of family, gender roles     |

|                        |                                                                                    |                                                                                                        |
|------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Infrastructural</b> | Measure of technological advancement, available media and their relative influence | Energy Costs, Extent of computerization, No. of Telephones, Fax Machines, Presence of Mass media, etc. |
|------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|

### Personnel

International research needs a real commitment in terms of personnel resources, such as sampling experts, telephone interviewing experts, etc. and executives with appropriate skills

### International Marketing Research in Practice

There are many major research agencies with multinational operations that provide the benefit of coordinating the project from the home country and assuring the clients of comparability.

These agencies also ensure that they have local staff in all of these countries that are familiar with the local culture and traditions and will be in a position to provide better insight about the market.

Quotations from two or three international research organizations are obtained.

Price is not necessarily the deciding factor. A cheaper quote may mean less rigorous procedures.

### Recap of the Course

- Now when you have completed the course, you should be able to do the following tasks:
- Understand the management dilemma and the decision making situation confronting the marketing manager.
- Discuss and finalize the research problem.
- Write the marketing research objectives.
- Review the related literature and develop research questions and or research hypotheses, if any.

- Prepare a research design.
- Determine sample size and select the sample using an appropriate sampling method.
- Develop the data collection instrument appropriate for your research project
- Collect data and monitor the field work.
- Analyze data using appropriate statistical techniques.
- Write a professional research report and give oral presentation if required by the management/client.

### Bibliography

Aaker, David A and Day, George S (1990) Marketing Research 4<sup>th</sup> Ed. New York, John Wiley & Sons.

Beresnson, Mark L. (1996) *Basic Business Statistics* 6<sup>th</sup> Ed. Parentice Hall International

Burns, Alvin C and Bush, Ronald F. (2001) Marketing Research 3<sup>rd</sup> Ed. New Jersey Parentic-Hall International Inc.

Churchil, Gilbert A. Basic (1992) Marketing Research. Oralando, the Dryden Press

Kinnear, Thomas C and Taylor, James R. (1996). Marketing Research. An Applied Approach 5<sup>th</sup> Ed. New York, McGraw Hill

Levine, David M, Krehbiel, timothy C and Berensopn, Mark L. (2003) *Business Statistics: A First Course*. 3<sup>rd</sup> Ed, Pearson

Malhotra, Naresh K. (2007) Marketing Research: An applied orientation. Pearson Education

Peterson, Robert A. (1988) *Marketing Research* 2<sup>nd</sup> Ed. Texas Business Publications Inc.

Watson, Collin; Billingslay, Patrickaud Huntsberger, David V (1993). *Statstics for Management and Economics* 5<sup>th</sup> Ed. Allyn and Baron

Zikmund, William G. (1994) *Business Research Methods*. 4<sup>th</sup> Ed. The Dryden Press