BUSINESS RESEARCH METHODS (sub code:BA 927)

UNIT I

INTRODUCTION

1.1 MEANING OF RESEARCH

Research refers to a search for knowledge. Research is an art of scientific investigation. ***The Advanced Learner's Dictionary of Current English lays down the meaning of research as, "a careful investigation or inquiry specially through search for new facts in any branch of knowledge"***.

1.1.1 SOME DEFINITIONS

Redman and Mory define research as a," Systematized effort to gain new knowledge". Some people consider research as a movement, a movement from the known to the unknown.

According t Clifford woody, research comprises defining and redefining problems, formulating hypothesis or suggested solutions collecting, organising and evaluating data, making deductions and reaching conclusions; to determine whether they fit the formulating hypothesis.

1.2 OBJECTIVES OF RESEARCH

1. To gain familiarity with a phenomenon or to achieve new insights into it. (exploratory or formulative research studies)

2. To describe accurately the characteristics of a particular individual, situation or a group. (descriptive research)

3. To determine the frequency with which something occurs or with which it is associated with something else. (studies with this object known as diagnostic research)

4. To test a hypothesis of a causal relationship between variables. (such studies are known as hypothesis testing research)

1.3 TYPES OF RESEARCH

It is imperative that a marketer has to have a broad understanding of the various types of research, in general. There are eleven types of research depending on whether it is primarily "fundamental" or "applied" in nature. They are as follows:

1. ***Applied research,*** also known as *decisional research,* use existing knowledge as an aid to the solution of some given problem or set of problems.

2. ***Fundamental research,*** frequently called basic or pure research, seeks to extend the boundaries of knowledge in a given area with no necessary immediate application to existing problems.

3. ***Futuristic research*****:** Futures research is the systematic study of possible future conditions. It includes analysis of how those conditions might change as a result of the implementation of policies and actions, and the consequences of these policies and actions.

4. ***Descriptive research*** includes surveys and fact-finding enquiries of different kinds. It tries to discover answers to the questions *who, what, when and* sometimes *how*. Here the researcher attempts to describe or define a subject, often by creating a profile of a group of problems,

people, or events. The major purpose of descriptive research is description of the state of affairs as it exists at present

5. ***Explanatory research:*** Explanatory research goes beyond description and attempts to explain the reasons for the phenomenon that the descriptive research only observed. The research would use theories or at least hypothesis to account for the forces that caused a certain phenomenon to occur.

6. ***Predictive research:*** If we can provide a plausible explanation for an event after it has occurred, it is desirable to be able to predict when and in what situations the event will occur. This research is just as rooted in theory as explanation. This research calls for a high order of inference making. In business research, prediction is found in studies conducted to evaluate specific courses of action or to forecast current and future values.

7. ***Analytical research:*** The researcher has to use facts or information already available, and analyse these to make a critical evaluation of the material.

8. ***Quantitative research:*** Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity.

9. ***Qualitative research:*** It is concerned with qualitative phenomenon (i.e.) phenomena relating to or involving quality or kind. This type of research aims at discovering the underlying motives and desires, using in depth interviews for the purpose. Other techniques of such research are word association test, sentence completion test, story completion tests and similar other projective techniques. Attitude or opinion research i.e., research designed to find out how people feel or what the think about a particular subject or institution is also qualitative research.

10. ***Conceptual research:*** Conceptual research is that related to some abstract idea(s) or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones.

11. ***Empirical research:*** It is appropriate when proof is sought that certain variables affect other variables in some way. Evidence gathered through experiments or empirical studies is today considered to be the most powerful support possible for a give hypothesis.

1.4 THE RESEARCH PROCESS

Several authors have attempted to enumerate the steps involved in the research process, however, inconclusive. Nevertheless, the research process broadly consists of the following steps and predominantly follows a sequential order as depicted in figure 1.1.

1. Problem formulation

2. Development of an approach to the problem

3. Research Design

4. Selection of Data collection techniques

5. Sampling techniques

6. Fieldwork or Data Collection

7. Analysis and interpretation

8. Report preparation and presentation

The above mentioned steps may be placed in three groups as follows:

First there is initiating or planning of a study, which comprises the initial four steps in our model: determining (1) problem formulation, (2) development of an approach to the problem (3) Research design (4) selection of data collection techniques (5) sampling techniques.

Second, there is (6) fieldwork or data collection

Third, there is (7) analysis and interpretation of the data and (8) report preparation and presentation.

1.5 PROBLEM IDENTIFICATION

The starting point of any research is to formulate the problem and mention the objectives before specifying any variables or measures. This involved defining the problem in clear terms. Problem definition involves stating the general problem and identifying the specific components of the research problem. Components of the research problem include (1) the decision maker and the objectives (2) the environment of the problem (3) alternative courses of action (4) a set of consequences that relate to courses of action and the occurrence of events not under the control of the decision maker and (5) a state of doubt as to which course of action is best. Here, the first two components of the research problem are discussed whereas others are not well within the scope, though, not beyond.

Problem formulation is perceived as most important of all the other steps, because of the fact that a clearly and accurately identified problem would lead to effective conduct of the other steps involved in the research process. Moreover, this is the most challenging task as the result yields information that directly addresses the management issue, though, the end result is for the management to understand the information fully and take action based on it. From this we

understand, that the correctness of the result depends on how well the research takes on, at the starting point.

Problem formulation refers to translating the management problem into a research problem. It involves stating the general problem and identifying the specific components of research problem. This step and the findings that emerge would help define the management decision problem and research problem.

Research problem cannot exist in isolation as it is an outcome of management decision problem. The management decision problem may be, for example, to know whether keeping Saturday a working day would increase productivity. The associated research problem for the above example may be the impact of keeping Saturday a working day on employee morale. The task of the researcher is to investigate on employee morale. Hence, it is understood that the researcher is perhaps, a scientific means, to solve the management problem the decision maker faces.

1.6 ROLE OF INFORMATION IN PROBLEM FORMULATION

Problem formulation starts with a sound information seeking process by the researcher. The decision maker is the provider of information pertaining to the problem at the beginning of the research process (problem formulation) as well as the user of the information that germinates at the end of the research process. Given the importance of accurate problem formulation, the research should take enough care to ensure that information seeking process should be well within the ethical boundaries of a true research. The researcher may use different types of information at the problem formulation stage. They are:

1. Subjective information termed as those based on the decision maker's past experiences, expertise, assumptions, feelings or judgments without any systematic gathering of facts. Such information is usually readily available.
2. Secondary information are those collected and interpreted at least once for some specific situation other than the current one. Availability of this type of information is normally high.
3. Primary information refers to first hand information derived through a formalised research process for a specific, current problem situation.

In order to have better understanding on problem formulation, the researcher may tend to categorise the information collected into four types. The categorisation of the information is done based on the quality and complexity of the information collected. They are:

1. Facts are some piece of information with very high quality information and a higher degree of accuracy and reliability. They could be absolutely observable and verifiable. They are not complicated and are easy to understand and use.
2. Estimates are information whose degree of quality is based on the representativeness of the fact sources and the statistical procedures used to create them. They are more complex than facts due to the statistical procedures involved in deriving them and the likelihood of errors.
3. Predictions are lower quality information due to perceived risk and uncertainty of future conditions. They have greater complexity and are difficult to understand and use for decision-making as they are forecasted estimates or projections into the future.

4. Relationships are information whose quality is dependent on the precision of the researcher's statements of the interrelationship between sets of variables. They have the highest degree of complexity as they involve any number of relationships paths with several variables being analysed simultaneously.

1.7 APPROACHES TO THE PROBLEM

The outputs of the approach development process should include the following components: (i) Objective/theoretical framework (ii) analytical model (iii) Research questions (iv) hypothesis. Each of these components is discussed below:

(i) ***Objective/theoretical framework:*** Every research should have a theoretical framework and objective evidence. The theoretical framework is a conceptual scheme containing:

a set of concepts and definitions

 a set of statements that describes the situations on which the theory can be applied

 a set of relational statements divided into: axioms and theorems

The theoretical evidence is very much imperative in research as it leads to identification of variables that should be investigated. They also lead to formulating the operational definition of the marketing problem. An operational definition is a set of procedures that describe the activities one should perform in order to establish empirically the existence or degree of existence of a concept.

Operationalising the concept gives more understanding on the meanings of the concepts specified and explication of the testing procedures that provide criteria for the empirical

application of the concepts. Operational definition would specify a procedure that involves say, for example, a weighing machine that measures the weight of a person or an object.

(ii) ***Analytical model:*** An analytical model could be referred to as a likeness of something. It consists of symbols referred to a set of variables and their interrelationships represented in logical arrangements designed to represent, in whole or in part, some real system or process. It is a representation of reality making explicit the significant relationships among the aspects. It enables the formulation of empirically testable propositions regarding the nature of these relationships. An empirical model refers to research that uses data derived from actual observation or experimentation.

(iii) ***Research Questions:*** Research questions are refined statements of the specific components of the problem. It refers to a statement that ascertains the phenomenon to be studied. The research questions should be raised in an unambiguous manner and hence, would help the researcher in becoming resourceful in identifying the components of the problem. The formulation of the questions should be strongly guided by the problem definition, theoretical framework and the analytical model. The knowledge gained by the researcher from his/her interaction with the decision maker should be borne in mind as they sometimes form the basis of research questions.

The researcher should exercise extreme caution while formulation research questions as they are the forerunner for developing hypothesis. Any flaw in the research questions may lead to flawed hypothesis. The following questions may be asked while developing research questions:

a) Do I know the area of investigation and its literature?

b) What are the research questions pertinent to the area of investigation?

c) What are the areas that are not explored by the previous researchers?

d) Would my study lead to greater understanding on the area of study?

e) Are enough number of literatures available in this topic area?

f) Is my study a new one thus contributing to the society or has it been done before?

(iv) ***Hypothesis:*** Hypothesis could be termed as tentative answers to a research problem. The structure of a hypothesis involves conjectural statements relating to two or more variables. They are deduced from theories, directly from observation, intuitively, or from a combination of these. Hypothesis deduced from any of the means would have four common characteristics. They should be clear, value-free, specific and amenable to empirical testing.

Hypothesis could be viewed as statements that indicate the direction of the relationship or recognition of differences in groups. However, the researcher may not be able to frame hypotheses in all situations. It may be because that a particular investigation does not warrant a hypothesis or sufficient information may not be available to develop the hypotheses.

UNIT II

RESEARCH DESIGN AND MEASUREMENT

2.1 INTORDUCTION

With the completion of the initial phase of the research process, the researcher turns to designing a research design to formally identify the appropriate sources of data. This is done in order that any researcher who embarks on a research project should have a blueprint of how he is going to undertake scientifically the data collection process. The framework developed to control the collection of data is called research design.

Research design is an absolute essentiality in research irrespective of the type of research (e.g., exploratory or descriptive), as it ensures that the data collected is appropriate, economical and accurate. This also ensures that the research project conducted is effectively and efficiently done. A sufficiently formulated research design would ensure that the information gathered is consistent with the study objectives and that the data are collected by accurate procedures. Since, research designs germinate from the objectives, the accuracy and adequacy of a research design depends on the unambiguous framing of the objectives.

2.2 TYPES OF RESEARCH DESIGN

Two types of research design are established according to the nature of the research objectives or types of research. They are:

 Exploratory design; and

 Conclusive design. (Descriptive researh and casual research)

2.2.1 Exploratory Research Design

It is appropriate when the research objective is to provide insights into (i) identifying the problems or opportunities (ii) defining the problem more precisely, (iii) gaining deeper insights into the variables operating in a situation (iv) identifying relevant courses of action (v) establishing priorities regarding the potential significance of a problems or opportunities (vi) gaining additional insights before an approach can be developed and (vii) gathering information on the problems associated with doing conclusive research. Much research has been of an exploratory nature; emphasising on finding practices or policies that needed changing and on developing possible alternatives.

On examination of the objectives of exploratory research, it is well understood that it could be used at the initial stages of the decision making process. It allows the marketer to gain a greater understanding of something that the researcher doesn't know enough about. This helps the decision maker and the researcher in situations when they have inadequate knowledge of the problem situation and/or alternative courses of action. In short, exploratory research is used in the absence of tried models and definite concepts.

Exploratory research could also be used in conjunction with other research. As mentioned below, since it is used as a first step in the research process, defining the problem, other designs will be used later as steps to solve the problem. For instance, it could be used in situations when a firm finds the going gets tough in terms of sales volume, the researcher may develop use exploratory research to develop probable explanations. Analysis of data generated using exploratory research

is essentially abstraction and generalization. Abstraction refers to translation of the empirical observations, measurements etc. into concepts; generalization means arranging the material so that it focuses on those structures that are common to all or most of the cases.

The exploratory research design is best characterised by its flexibility and versatility. This is so, because of the absence of the non-imperativeness of a structure in its design. It predominantly involves imagination, creativity, and ingenuity of the researcher. Examples of exploratory research are:

- survey of experts tovalidate an instrument;
- pilot studies conducted to perform reliability check on a questionnaire;
- use of secondary data in order to analyse it in a qualitative way;
- qualitative research.

2.2.2 Conclusive Research Design

It involves providing information on evaluation of alternative courses of action and selecting one from among a number available to the researcher. As portrayed in the figure 4.1, conclusive research is again classified as:

(i) Descriptive research, and

(ii) Causal research.

(i) ***Descriptive Research:*** It is simple to understand as the name itself suggests that it involves describing something, for example:

(a) market conditions;

(b) characteristics or functions;

(c) estimate the percentage of customers in a particular group exhibiting the same purchase behaviour;

(d) perceptions of product characteristics; and

(e) to predict the pattern of behaviour of characteristic versus the other

Majority of research studies are descriptive studies. As research studies involve investigating the customers/consumers, collection of data includes interrogating the respondents in the market and data available from secondary data sources. However, it cannot be concluded that descriptive studies should be simply fact-gathering process. Descriptive study deals with the respondents in the market and hence, extreme caution has to be exercised in developing this study. Much planning should be done, objectives should be clear than exploratory studies.

In descriptive research, the data is collected for a specific and definite purpose and involves analysis and interpretation by the researcher. The major difference between exploratory and descriptive research is that descriptive research is characterised by the formulation of specific objectives. The success of descriptive studies depends on the degree to which a specific hypothesis acts as a guide.

Descriptive studies restrict flexibility and versatility as compared to exploratory research. It involves a higher degree of formal design specifying the methods for selecting the sources of information and for collecting data from those sources. Formal design is required in order to ensure that the description covers all phases desired. It is also required to restrain collection of unnecessary data. Descriptive studies require a clear specification of the who, when, where, what, why and how.

While designing a descriptive research, the researcher should also have sufficient knowledge on the nature and type of statistical techniques he/she is going to use. This will greatly help to have the right design in place. Mostly descriptive studies are conducted using questionnaire, structured interviews and observations. The results of description studies are directly used for marketing decisions.

Descriptive studies are again classified into two types:

(a) Longitudinal

(b) Cross sectional

(a) Longitudinal research relies on panel data and panel methods. It involves fixing a panel consisting of fixed sample of subjects that are measured repeatedly. The panel members are those who have agreed to provide information at a specific intervals over an extended period. For example, data obtained from panels formed to provide information on market shares are based on an extended period of time, but also allow the researcher to examine changes in market share over time. New members may be included in the panel as an when there is a dropout of the existing members or to maintain representativeness.

Panel data is analytical and possess advantages with respect to the information collected in the study. They are also considered to be more accurate than cross sectional data because panel data better handle the problem associated with the errors that arise in reporting past behaviour and the errors that arise because of the necessary interaction between interviewer and respondent.

(b) Cross-sectional research is the most predominantly and frequently used descriptive research design in marketing. It involves a sample of elements from the population of

interest. The sample elements are measured on a number of characteristics. There are two types of cross-sectional studies:

 Field studies and

 Surveys

It may appear that field studies and surveys are no different but the same. However, for practical reasons, they are classified into two categories cross sectional research. The fundamental difference lies in the depth of what these research cover. While survey has a larger scope, field study has greater depth. Survey attempts to be representative of some known universe and filed study is less concerned with the generation of large representative samples and is more concerned with the in-depth study of a few typical situations.

Cross sectional design may be either single or multiple cross sectional design depending on the number of samples drawn from a population. In single cross sectional design, only one sample respondents is drawn whereas in multiple cross sectional designs, there are two or more samples of respondents. A type of multiple cross sectional design of special interest is Cohort analysis.

Cohort analysis consists of a series of surveys conducted at appropriate time intervals, where the cohort serves as the basic unit of analysis. A cohort is a group of respondents who experience the same event within the same time interval.

(a) ***Case Study****:* This study involves intensive study of a relatively small number of cases. In this method, much emphasis is on obtaining a complete description and understanding of factors in each case, regardless of the number involved. It could be used significantly, particularly when one is seeking help on a problem in which interrelationships of number of factors are involved, and in which it is difficult to understand the individual factors without considering them in their relationships with each other. As in the case of exploratory research, case method is also used in conjunction with exploratory research as first step in a research process. It is of prime value when the researcher is seeking help on a market problem in which the interrelationships of a number of factors are involved, and in which it is difficult to understand the individual factors without considering them in their relationships with each other.

(ii) ***Causal research:*** It is used to obtain evidence of cause-and-effect relationships with is otherwise known as the independent-dependent relationship or the predictive relationships. This is an important type of research useful for marketers as this allows marketers to base their decision on assumed causal relationships. Causal research is done in the following situations:

(a) To identify which variables are the cause and which are the effect. In statistical terms, causal variables are called independent variables and effectual variables are called dependent variables.

(b) To determine the nature of the relationship between the causal variables and the effect to be predicted.

Causal research requires a strong degree of planning on the design as its success depends on the structure of the design.

2.3 THE MEASUREMENT PROCESS

Measurement is defined as the assignment of numbers to characteristics of objects or events according to rules. The definition of measurement clearly states that the researcher should know that the measurement scale measures the characteristics of the objects or event and not the objects or events.

Further, to make the measurement process effective, the relationships existing among the objects or events in the empirical system should directly correspond to the rules of the number system. If this correspondence is misrepresented, measurement error has occurred. The term number indicates the application of numbers to various aspects measured in the measurement process. Data analysis is a statistical process done on the data generated using scales. Hence, all measures should be converted into quantitative terms by applying numbers. However, the definition of measurement imposes certain restrictions on the type of numerical manipulations admissible.

The numerical application on all measurements and the analysis of numbers using mathematical or statistics involve one or more of the four characteristics of number system. Measurement of any property could be fitted into any of these characteristics.

2.4 LEVELS OF MEASUREMENT

Researchers normally use four level of measurement scales. They are:

a) Nominal scale

b) Ordinal scale

c) Interval scale

d) Ratio scale

2.4.1 Nominal Scale

Nominal scale are categorical scales used to identify, label or categorise objects or persons or events. A familiar example is the use of alternative numbering system by our Physical Education Teacher in our school days to engage us in a game. The teacher as a result would form two groups one labelled 1 and the other 2. The numbers 1 and 2 are assigned to two groups and the members belonging to group 1 would exclusively be a part of group 1 and the members belonging to group 2 would exclusively be a part of group 2. However, assigning the numbers does not indicate any order or position to the group it represents. Interchanging the numbers otherwise would also result in the same effect in that, the order or position would not change.

Nominal scales are the lowest form of measurement. The simple rule to be followed while developing a nominal scale: Do not assign the same numerals to different objects or events or different numbers to the same object or event. In marketing nominal scales are used substantially in many occasions. For example, nominal scale is used to identify and classify brands, sales regions, awareness of brands, working status of women etc.,

On data generated using nominal scale, the type of statistical analysis appropriate are mode, percentages, and the chi-square test. Mode alone could be used as a measure of central tendency. Mean and median could be employed on nominal data since they involve higher level properties of the number system. Researchers should be careful enough to identify the type of scales before they apply any statistical technique. The researcher may not be able to make any meaning inference from the mean or median value obtained from nominal data.

2.4.2 Ordinal Scale

Ordinal scale is a ranking scale that indicates ordered relationship among the objects or events. It involves assigning numbers to objects to indicate the relative extent to which the objects possess some characteristic. It measure whether an object or event has the same characteristic than some other object or event. It is an improvement over nominal scale in that it indicates an order. However, this scale does not indicate on how much more or less of the characteristic various objects or events possess. The term how much refers to ranks that it do not indicate if the second rank is a close second or a poor second to the first rank.

Data generated using ordinal scale appears as ranks where the object which has ranked first has more of the characteristic as compared to those objects ranked second or third. Hence, the important feature of ordinal scale over nominal scale is that it indicates relative position, not the magnitude of the difference between the objects. In research, ordinal scales are used to measure relative attitudes, opinions, perceptions etc., Most data collected by the process of interrogating people have ordinal properties. To illustrate, a marketer may be interested in knowing the preference of the customers across various brands. The customers may be requested to rank the products in terms of their preference for the products.

The numbers assigned to a particular object or event can never be changed in ordinal scales. Any violation of this principle would result in confounding results by the researcher. Mean is not an appropriate statistic for ordinal scale.

2.4.3 Interval Scale

Interval scale is otherwise called as rating scale. It involves the use of numbers to rate objects or events. It interval scales, numerically equal distances on the scale represent equal values in the

characteristic being measured. Interval scale is an advancement over the ordinal scale that it has all the properties of an ordinal scale plus it allows the researcher to compare the differences between objects. It also possesses the property of equality of difference between each levels of measurement. The feature of this scale is that the difference between any two scale values is identical to the difference between any other two adjacent values of an interval scale. Examples of interval scales are the Fahrenheit and Celsius scales.

Interval scales also place restriction on the assignment of values to the scale points. The zero that could be assignment is a arbitrary zero rather than a natural zero. Arbitration involves freedom to place the zero value on any point. There is a constant or equal interval between scale values.

In research, most of the research on attitudes, opinions and perceptions are done using scales treated as interval scales. All statistical techniques that are employed on nominal and ordinal scales could also be employed on data generated using interval scales.

2.4.4 Ratio Scales

Ratio scales differ from interval scales in that it has a natural/absolute zero. It possesses all the properties of the normal, ordinal and interval scales. Data generated using ratio scales may be identified, classified into categories, ranked and compared with others properties. It could also be expressed in terms of relativity in that one can be expressed in terms of a division of the other. Hence, it may be called as relative scales.

Ratio scales have great many number of application in research. They include sales, market share, costs, ages, and number of customers. In all these cases, natural zero exists. All statistical techniques can be applied on ratio data.

2.5 PERFECT MEASUREMENT

Research should always be based on absolutely correct, defectless and errorless measuring instruments, tools or procedures of measurement. For this purpose the acceptability of a measuring instrument should be tested on the principles of adherence to the standards of perfect reliability, confirmed practicality and verified validity. The reliability of an instrument can be ensured when it conforms to certain prescribed norms. It is not the physical form or shape but it is the accuracy of the prescribed standard content of the instrument that leads to acceptability. An instrument should be conveniently usable with verifiable validity. Perfection in measurement can be achieved if a researcher, at the outset, carries out appropriately, the prescribed tests of reliability, practical acceptability and validity of his tools of measurement.

2.5.1 Errors in Measurement

Errors in the course of measurement can be traced to a number of factors such as carelessness, negligence, ignorance in the usage of the instruments. If appropriate and defectless instruments are used and care is taken in the process of measurement, only then can accuracy in research be ensured.

In regard to survey-work, where the researcher obtains information through interviews, it is necessary, to judge as to whether the respondent is providing accurate facts or is biased. As situational factors also influence measurement, it is imperative that the researcher adopts his measuring procedures accordingly.

Research findings and conclusions can be reliable and acceptable if they are based on sound analysis carried out through appropriate procedures of error-free and perfect measuring tools.

2.6 SCALING TECHNIQUES

A well-designed research problem constitutes a well designed measurement process. The process of measurement is a fundamental aspect of any research. This is the step where you actually try to find out the reality by measuring it. Decision makers are more interested as the steps prior to this step are purely descriptive, and, this is the step where actual quantification happens.

Developing effective measures of marketing is not an easy task. The measures should be devoid of measurement errors. There may be disastrous situations where the marketer may be confused with the findings of the data. If he is well aware of the confounding results, then he may discard the findings the emerge from the data analysis. This requires lot of wisdom and knowledge in identifying if the data that resulted from the measurement is consistent, unambiguous etc., But unfortunately, marketers may not be interested in knowing or rather would not know the type of scales used to measure the aspects involved in the marketing problem. Any decision made based on the findings would lot of negative implications on the organisation. Hence, it is very imperative that the researcher is wise enough to develop measurement scales that capture the right property with appropriately.

The scaling techniques employed in research could be broadly classified into comparative and non comparative scale. Comparative scales as its name indicate derive their name from the fact that all ratings are comparisons involving relative judgements. It involves direct comparison of stimulus objects. It contains only ordinal or rank order properties. It is also otherwise called non metric scales in that it does not allow any numerical operations on it

against all that could be applied on interval and ratio scales. Comparative scales involve the direct comparison of stimulus objects.

2.7 COMPARATIVE SCALING TECHNIQUES

Comparative scaling techniques consist of:

a) Paired comparison scaling

b) Rank order scaling

c) Constant sum scaling and

d) Q-sort.

2.7.1 Paired Comparison Scaling

Paired comparison scaling as its name indicates involves presentation of two objects and asking the respondents to select one according to some criteria. The data are obtained using ordinal scale. For example, a respondent may be asked to indicate his/her preference for TVs in a paired manner.

Paired comparison data can be analysed in several ways. In the above example, the researcher can calculate the percentage of respondents who prefer one particular brand of TV over the other. Under the assumption of transitivity, data generated using paired comparison technique could be converted to a rank order. Transitivity of preference implies that if a respondent prefers brand X over brand Y, and brand Y is preferred to Z, then brand X is preferred to Z. This may be done by determining the number of times each brand is preferred by preference, from most to least preferred.

Paired comparison technique is useful when the number of brands is limited, as it requires direct comparison and overt choice. However, it is not so, that possible comparison could not be made, but comparisons would become so much unwieldy.

The most common method of taste testing is done by paired comparison where the consumer may be, for example, asked to taste two different brands of soft drinks and select the one with the most appealing taste.

2.7.2 Rank Order Scaling

This is another popular comparative scaling technique. In rank order scaling is done by presenting the respondents with several objects simultaneously and asked to order or rank them based on a particular criterion. For example, the customers may rank their preference for TVs among several brands. In this scaling technique, ordinal scale is used. The consumers may be asked to rank several brands of television in an order, 1 being the most preferred brand, followed by 2, 3 and so on. Like paired comparison, it is also comparative in nature.

Data generated using this technique are employed with conjoint analysis because of the discriminatory potential of the scaling, stimulating the consumers to discriminate one brand from the other.

Under the assumptions of transitivity, rank order can be converted to equivalent paired comparison data, and vice versa.

2.7.3 Constant Sum Scaling

This technique allows the respondents to allocate a constant sum of units, such as points, rupees or among a set of stimulus objects with respect to some criterion. The technique involves asking

the respondents to assign 10 points to attributes of a sports utility vehicle. If the attribute is unimportant, then the respondents would want to enter zero.

The attributes are scaled by counting the points assigned to each one by al the respondents and dividing the number of respondents. This predominantly uses ordinal because of its comparative nature and the resulting lack of generalisability. Constant sum scaling has advantage in that it allows for discrimination among stimulus objects without requiring too much time. Its advantage involves allocation of more or fewer units than those specified.

2.7.4 Q-Sort

Q-sort refers to discriminating among a relatively large number of objects quickly. This technique uses a rank order procedure in which objects are sorted into piles based on similarity with respect to some criterion. A typical example quoted in Malhotra (2004) is as follows:

Respondents are given 100 attitude statements on individual cards and asked to place them into 11 piles, ranging from ‘most highly agreed with’ to ‘least highly agreed with’. The number of objects to be sorted should not be less than 60 nor more than 140: 60 to 90 objects is a reasonable range. The number of objects to be placed in each pile is pre-specified, often to result in a roughly normal distribution of objects over the whole set.

2.8 NON-COMPARATIVE SCALING TECHNIQUES

Non-comparative scales or otherwise called as nomadic scales because only one object is evaluated at a time. Researchers use this scale allowing respondents to employ whatever rating standard seems appropriate to them and not specified by the researcher. The respondents do not

compare the object being rated either to another object or to some specified standard set by the researcher. Non-comparative techniques use continuous and itemised rating scales.

In such scales, each object is scaled independently of the other objects in the stimulus set, the resulting data is generally assumed to be interval or ratio scale.

2.8.1 Continuous Rating Scale

This is also otherwise called as graphic rating scale. This is a type of scale that offers respondents a form of continuum (such as a line) on which to provide a rating of an object. Researchers develop continuous rating scale allowing the respondents to indicate their rating by placing a mark at the appropriate point on a line that runs from one end of the criterion variable to the other or a set of predetermined response categories. Here the respondents need not select marks already set the researcher.

There are several variations that are possible. The line may be vertical or horizontal; it may be unmarked or marked; if marked, the divisions may be few or as many as in the thermometer scale; the scale points may be in the form of numbers or brief descriptions. Three versions are normally used as given in the table below:

Examples of continuous rating scale

Please evaluate the service quality of a restaurant by placing an x at the position on the horizontal line that most reflects your feelings

Empathy

The worst ----------

The best

Continuous rating scales are easy to construct, however, the scoring may be cumbersome and unreliable. With the advent of computers in research, they are increasingly used, though, they otherwise provide little new information.

2.8.2 Itemised Rating Scales

This scale is similar to the graphic scale in that the individuals make their judgement independently, without the benefit of direct comparison. The respondents are provided with a scale that has a number or brief description associated with each category. This scale allows the respondents to choose from a more limited number of categories, usually five to seven, although 10 or more are rarely used. The categories are ordered in terms of scale position; and the respondents are required to select the specified category that best describes the object being rated. The categories are given verbal description, although this is not absolutely necessary. These scales are widely used in research and nowadays, more complex types such as multi-item rating scales are used. There are few variants among itemised rating scales. They are Likert, Semantic differential and stapel scales.

Likert Scale

This scale is named after Renis Likert. This is the most widely used scale in research, in particular, in testing models. Several research studies are done using Likert scale. The respondents require to indicate a degree of agreement of disagreement with each of a series of statements about the stimulus objects. Example of a portion of a popularly used Likert scale to measure tangibility of service is given below.

Listed below are the tangibility of service rendered by a bank is given below. Please indicate how strongly you agree or disagree with each by using the following scale

1 = Strongly disagree

2 = Disagree

3 = Neither agree nor disagree

4 = Agree

5 = Strongly agree

To analyse the data generated using this scale, each statement is assigned a numerical score, ranging either from -2 to +2 through a zero or 1 to 5. The analysis can be conducted item wise or a total score (summated) or a mean can be calculated for each respondent by summing or averaging across items. It is important in Likert scale that a consistent scoring procedure so that a high score reflects favourable response and a low score reflects unfavourable response. Any deviation in the form of reverse coding where the lowest value is given to a favourable response and highest value is given to an unfavourable response should be clearly specified by the researcher. Usually, reverse coding is used when the statements indicate a negative concept and when used with other statements, reverse coding would give a positive effect.

Semantic Differential Scale

Semantic differential scale is a popular scaling technique next to Likert scale. In this scale, the respondents associate their response with bipolar labels that have semantic meaning. The respondents rate objects on a number of itemised, seven point rating scales bounded at each end by one of two bipolar adjectives such as “Excellent” and “Very bad”. The respondents indicate their response choosing the one that best describes their choice.

The points are marked either from - 3 to +3 through a zero or from 1 to 7. The middle value may be treated as a neutral position. The value zero in the first type is the neutral point and 4 in the

second type is the neutral point. The resulting data are commonly analysed through profile analysis. In such analysis, the means or median values on each rating scale are calculated and compared by plotting or statistical analysis. This would help the researcher to determine the overall differences and similarities among the objects.

To assess differences across segments of respondents, the researcher can compare mean responses of different segments. This data generated using this scale could be employed with summary statistics such mean, though, there is a controversy on the employment of mean on this scale. Mean is typical of Interval and ratio scales whereas this scale theoretically is an ordinal scale. However, looking beyond this objection by statisticians, researchers invariably apply all statistical techniques on this scale. The following example illustrates semantic differential scales

1) Pleasant ---------- unpleasant

2) Aggressive ---------- submissive

3) Exciting ---------- unexciting

Stapel Scale

This scale is named after Jan Stapel, who developed it. This is a unipolar rating scale with in general 10 categories number from -5 to +5 without a neutral point (zero). This scale is usually presented vertically and respondents choose their response based on how accurately or inaccurately each item describes the object by selecting an appropriate numerical response category. The higher number indicates more accurate description of the object and lower number indicates lower description of the object. An example is given below:

+ 5

+4

+3

+2

+1

High tangibility of service

-1

-2

-3

-4

-5

The data generated using staple scale could be analysed in the same way as semantic differential scale. The main advantage of Stapel Scale is that it does not require a pretest of the adjectives or phrases to ensure true bipolarity, and it can be administered over the telephone.

UNIT III

DATA COLLECTION

3.1 INTRODUCTION

The next step in the research process after identifying the type of research the researcher intends to do is the deciding on the selection of the data collection techniques. The data collection technique is different for different types of research design. There are predominantly two types of data: (i) the primary data and (ii) the secondary data.

Primary data is one a researcher collects for a specific purpose of investigating the research problem at hand. Secondary data are ones that have not been collected for the immediate study at hand but for purposes other than the problem at hand. Both types of data offer specific advantages and disadvantages.

a) Secondary data offer cost and time economies to the researcher as they already exist in various forms in the company or in the market.

b) It is feasible for a firm to collect.

c) Since they are collected for some other purposes, it may sometimes not fit perfectly into the problem defined.

d) The objectives, nature and methods used to collect the secondary data may not be appropriate to the present situation.

Mostly secondary data helps to:

a) Identify the problem.

b) Better define the problem.

c) Develop an approach to the problem.

d) Formulate an appropriate research design by identifying the key variables.

e) Answer certain research questions and formulate hypotheses.

f) Interpret the primary data more in-depth.

3.2 SECONDARY DATA

Secondary data are the data that are in actual existence in accessible records, having been already collected and treated statistically by the persons maintaining the records. In other words, secondary data are the data that have been already collected, presented tabulated, treated with necessary statistical techniques and conclusions have been drawn. Therefore, collecting secondary data doesn't mean doing some original enumeration but it merely means obtaining data that have already been collected by some agencies, reliable persons, government departments, research workers, dependable organisations etc. Secondary data are easily obtainable from reliable records, books, government publications and journals.

When once primary data have been originally collected, moulded by statisticians or statistical machinery, then it becomes secondary in the hands of all other persons who may be desirous of handling it for their own purpose or studies. It follows, therefore, that primary and secondary data are demarcated separately and that the distinction between them is of degree only. It a person 'X' collects some data originally, then the data is primary data to 'X' whereas the same data when used by another person 'Y' becomes secondary data to 'Y'.

3.3 SOURCES OF SECONDARY DATA

The following are some of the sources of secondary data:

1. Central and State government publications.

2. Publications brought out by international organisation like the UNO, UNESCO, etc.

3. Foreign government publications.

4. Official publications as well as reports of municipalities, district parishads, etc.

5. Reports and publications of commissions - like U.G.C. education commission, tariff commission, chambers of commerce, co-operative societies, trade associations, banks, stock exchanges, business houses etc.

6. Well-know newspapers and journals like the *Economic Times, The Financial Express, Indian Journal of Economics, Commerce, Capital, Economical Eastern Economist,* etc. Further Year Books such as *Times of India Year Book, Statesman's Year Book* also provide valuable data.

7. Publications brought out by research institutions, universities as well as those published by research workers give considerable secondary data.

8. Through the Internet/website sources.

Though the given list of secondary data cannot be said to be thorough or complete, yet it can be pointed out that it fairly indicates the chief sources of secondary data. Also, besides the above mentioned data there are a number of other important sources, such as records of governments in various departments, unpublished manuscripts of eminent scholars, research workers, statisticians, economists, private organisations, labour bureaus and records of business firms.

3.4 TYPES OF SECONDARY DATA

Secondary data are of two types. Data that are originated from within the company are called as internal data. If they are collected for some other purpose, they are internal secondary data. This poses significant advantage as they are readily available in the company at low cost. The most convenient example internal secondary data is the figures relating sales of the company. Important internal source of secondary data is database marketing, Database marketing involves the use of computers to capture and track customer profiles and purchase details. The information about customer profile would serve as the foundation for marketing programmes or as an internal source of information related to preference of customer's preference of a particular product.

Published external secondary data refers to the data available without the company. There is such a pool of published data available in the market that it is sometimes easy to underestimate what is available and thereby bypass relevant information. Several sources of external data are available. They are:

General Business Data

Guides or small booklets containing information about a particular trade or business.

Directories are helpful for identifying individuals or organisations that collect specific data.

Indexes used to locate information on a particular topic in several different publications by using an index.

Non-governmental statistical data refers to published statistical data of great interest to researchers. Graphic and statistical analyses can be performed on these data to draw meaning inference.

Government Sources

Census data is a report published by the Government containing information about the population of the country.

Other Government publications may be pertaining to availability of train tickets just before it leaves.

Computerised Databases

Online databases are databases consisting of data pertaining to a particular sector (e.g., banks) that is accessed with a computer through a telecommunication network

 Internet databases are available in internet portals that can be accessed, searched, and analysed on the internet.

 Offline databases are databases available in the form of diskettes and CD-ROM disks.

Bibliographic databases comprises of citations in articles published in journals, magazines, newspapers etc.

Numeric databases contain numerical and statistical information. For example, time series data about stock markets.

Directory databases provide information on individuals, organisations and service. E.g. Getit Yellow pages.

Special-purpose databases are databases developed online for a special purpose.

External Data-syndicated In response to the growing need for data pertaining to markets, consumer etc., companies have started collecting and selling standardised data designed to serve the information needs of the shared by a number of organisations. Syndicated data sources can be

further classified as (a) consumer data (b) retail data (c) wholesale data (d) industrial data (e) advertising evaluation data and (f) media and audience data.

Consumer data relates to data about consumers purchases and the circumstances surrounding the purchase.

Retail data rely on retailing establishments for their data. The data collected focus on the products or services sold through the outlets and / or the characteristics of the outlets themselves.

 Wholesale data refers to data on warehouse shipment data to estimate sales at retail.

 Industrial data refers to substantially more syndicated data services available to consumer goods manufacturers than to industrial goods suppliers.

 Advertising evaluation data refers to money spent each year on media such as magazines and television with the expectation that these expenditures will result in sales.

3.5 VERIFICATION OF SECONDARY DATA

Before accepting secondary data it is always necessary to scrutinize it properly in regard to its accuracy and reliability. It may perhaps happen that the authorities collecting a particular type of data may unknowingly carry out investigations using procedures wrongly. Hence it is always necessary to carry out the verification of the secondary data in the following manner:

(i) Whether the organization that has collected the data is reliable.

(ii) Whether the appropriate statistical methods were used by the primary data enumerators and investigators.

(iii) Whether the data was collected at the proper time.

3.6 COLLECTION OF PRIMARY DATA

By primary data we mean the data that have been collected originally for the first time. In other words, primary data may be the outcome of an original statistical enquiry, measurement of facts or a count that is undertaken for the first time. For instance data of population census is primary. Primary data being fresh from the fields of investigation is very often referred to as raw data. In the collection of primary data, a good deal of time, money and energy are required.

3.6.1 QUESTIONNAIRE

A questionnaire is defined as a formalised schedule for collecting data from respondents. It may be called as a schedule, interview form or measuring instrument.

Measurement error is a serious problem in questionnaire construction. The broad objective of a questionnaire include one without measurement errors. Specifically, the objectives of a questionnaire are as follows:

a) It must translate the information needed into a set of specific questions that the respondents can and will answer.

b) The questions should measure what they are supposed to measure.

c) It must stimulate the respondents to participate in the data collection process. The respondents should adequately motivated by the virtual construct of the questionnaire.

d) It should not carry an ambiguous statements that confuses the respondents.

3.6.1.1 Questionnaire Components

A questionnaire consists typically of five sections. They are:

a) Identification data

b) Request for cooperation

c) Instruction

d) Information sought

e) Classification of data

a) Identification data occupation is the first section of a questionnaire where the researcher intends to collect data pertaining to the respondent's name, address and phone number.

b) Request for cooperation refers to gaining respondent's cooperation regarding the data collection process.

c) Instruction refers to the comments to the respondent regarding how to use the questionnaire.

d) The information sought form the major portion of the questionnaire. This refers to the items relating to the actual area of the study.

e) Classification data are concerned with the characteristics of the respondent.

3.6.2 OBSERVATION METHODS

This is another type of method used when the researcher feels that survey type of methods may not be so relevant in data collection. In subjective issues, respondents need to be observed rather than asked lest biases and prejudices happen in their response. Observation method may be either

structured or unstructured. Structured observation method involves having a set of items to be observed and how the measurements are to be recorded. In unstructured observation, the observer monitors all aspects of the phenomena that seem relevant to the problem at hand. In this context, the observer may have an open mind to study the persons or object.

3.7 SAMPLING DESIGN

research does not exist without sampling. Every research study requires the selection of some kind of sample. It is the life blood of research.

Any research study aims to obtain information about the characteristics or parameters of a population. A population is the aggregate of all the elements that share some common set of characteristics and that comprise the universe for the purpose of the research problem. In other words, population is defined as the totality of all cases that conform to some designated specifications. The specification helps the researcher to define the elements that ought to be included and to be excluded. Sometimes, groups that are of, interest to the researcher may be significantly smaller allowing the researcher to collect data from all the elements of population. Collection of data from the entire population is referred to as census study. A census involves a complete enumeration of the elements of a population.

Collecting data from the aggregate of all the elements (population) in case of, the number of elements being larger, would sometimes render the researcher incur huge costs and time. It may sometimes be a remote possibility. An alternative way would be to collect information from a portion of the population, by taking a sample of elements from the population and the on the basis of information collected from the sample elements, the characteristics of the population is inferred. Hence, Sampling is the process of selecting units (e.g., people, organizations) from a

population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen.

While deciding on the sampling, the researcher should clearly define the target population without allowing any kind of ambiguity and inconsistency on the boundary of the aggregate set of respondents. To do so, the researcher may have to use his wisdom, logic and judgment to define the boundary of the population keeping with the objectives of the study.

3.8 TYPES OF SAMPLING PLANS

Sampling techniques are classified into two broad categories of probability samples or non-probability samples.

3.8.1 Probability Sampling Techniques

Probability samples are characterised by the fact that, the sampling units are selected by chance. In such case, each member of the population has a known, non-zero probability of being selected. However, it may not be true that all sample would have the same probability of selection, but it is possible to say the probability of selecting any particular sample of a given size. It is possible that one can calculate the probability that any given population element would be included in the sample. This requires a precise definition of the target population as well as the sampling frame.

Probability sampling techniques differ in terms of sampling efficiency which is a concept that refers to trade off between sampling cost and precision. Precision refers to the level of uncertainty about the characteristics being measured. Precision is inversely related to sampling errors but directly related to cost. The greater the precision, the greater the cost and there should

be a tradeoff between sampling cost and precision. The researcher is required to design the most efficient sampling design in order to increase the efficiency of the sampling.

Probability sampling techniques are broadly classified as simple random sampling, systematic sampling, and stratified sampling.

Simple Random Sampling

This is the most important and widely used probability sampling technique. They gain much significance because of their characteristic of being used to frame the concepts and arguments in statistics. Another important feature is that it allows each element in the population to have a known and equal probability of selection. This means that every element is selected independently of every other element. This method resembles lottery method where a in a system names are placed in a box, the box is shuffled, and the names of the winners are then drawn out in an unbiased manner.

Simple random sampling has a definite process, though not, so rigid. It involves compilation of a sampling frame in which each element is assigned a unique identification number. Random numbers are generated either using random number table or a computer to determine which elements to include in the sample. For example, a researcher is interested in investigating the behavioural pattern of customers while making a decision on purchasing a computer. Accordingly, the researcher is interested in taking 5 samples from a sampling frame containing 100 elements. The required sample may be chosen using simple random sampling technique by arranging the 100 elements in an order and starting with row 1 and column 1 of random table, and going down the column until 5 numbers between 1 and 100 are selected. Numbers outside this range are ignored. Random number tables are found in every statistics book. It consists of a

randomly generated series of digits from 0 – 9. To enhance the readability of the numbers, a space between every 4^{th} digit and between every 10^{th} row is given. The researcher may begin reading from anywhere in the random number table, however, once started the researcher should continue to read across the row or down a column. The most important feature of simple random sampling is that it facilitates representation of the population by the sample ensuring that the statistical conclusions are valid.

Systematic Sampling

This is also another widely used type of sampling technique. This is used because of its ease and convenience. As in the case of simple random sampling, it is conducted choosing a random starting point and then picking every element in succession from the sampling frame. The sample interval, *i*, is determined by dividing the population size *N* by the sample size *n* and rounding to the nearest integer.

Consider a situation where the researcher intends to choose 10 elements from a population of 100. In order to choose these 10 elements, number the elements from one to 100. Within 20 population elements and a sample of size 10, the number is 10/100 = 1/10, meaning that one element in 10 will be selected. The sample interval will, therefore, be 10. This means that after a random start from any point in the random table, the researcher has to choose every 10^{th} element.

Systematic sampling is almost similar to simple random sampling in that each population element has a known and equal probability of selection. However, the difference lies in that simple random sampling allows only the permissible samples of size n drawn have a known and equal probability of selection. The remaining samples of size n have a zero probability of being selected

Stratified sampling

Stratified sampling is a two-way process. It is distinguished from the simple random sampling and systematic sampling, in that:

a) It requires division of the parent population into mutually exclusively and exhaustive subsets;

b) A simple random sample of elements is chosen independently from each group or subset.

Therefore, it characterises that, every population element should be assigned to one and only stratum and no population elements should be omitted. Next, elements are selected from each stratum by simple random sampling technique. Stratified sampling differs from quota sampling in that the sample elements are selected probabilistically rather than based on convenience or on judgemental basis.

Strata are created by a divider called the stratification variable. This variable divides the population into strata based on homogeneity, heterogeneity, relatedness or cost. Sometimes, more than one variable is used for stratification purpose. This type of sampling is done in order to get homogenous elements within each strata and, the elements between each strata should have a higher degree of heterogeneity. The number of strata to be formed for the research is left to the discretion of the researcher, though, researchers agree that the optimum number of strata may be 6.

The reasons for using stratified sampling are as follows:

a) it ensures representation of all important sub-populations in the sample;

b) the cost per observation in the survey may be reduced;

c) it combines the use of simple random sampling with potential gains in precision;

d) estimates of the population parameters may be wanted for each sub-population and;

e) increased accuracy at given cost.

3.8.2 Non-probability Sampling Methods

Non-probability sampling does not involve random selection. It involves personal judgement of the researcher rather than chance to select sample elements. Sometimes this judgement is imposed by the researcher, while in other cases the selection of population elements to be includes is left to the individual field workers. The decision maker may also contribute to including a particular individual in the sampling frame. Evidently, non probability sampling does not include elements selected probabilistically and hence, leaves an degree of 'sampling error' associated with the sample.

Sampling error is the degree to which a sample might differ from the population. Therefore, while inferring to the population, results could not be reported plus or minus the sampling error. In non-probability sampling, the degree to which the sample differs from the population remains unknown However, we cannot come to a conclusion that sampling error is an inherent of non probability sample.

Non-probability samples also yield good estimates of the population characteristics. Since, inclusion of the elements in the sample are not determined in a probabilistic way, the estimates obtained are not statistically projectable to the population.

The most commonly used non-probability sampling methods are convenience sampling, judgment sampling, quota sampling, and snowball sampling.

Convenience Sampling

Convenience samples are sometimes called accidental samples because the elements included in the sample enter by 'accident'. It is a sampling technique where samples are obtained from convenient elements. This refers to happening of the element at the right place at the right time, that is, where and when the information for the study is being collected. The selection of the respondents is left to the discretion of the interviewer. The popular examples of convenience sampling include (a) respondents who gather in a church (b) students in a class room (c) mall intercept interviews

without qualifying the respondents for the study (d) tear-out questionnaire included in magazines and (e) people on the street. In the above examples, the people may not be qualified respondents, however, form part of the sample by virtue of assembling in the place where the researcher is conveniently placed.

Convenience sampling is the least expensive and least time consuming of all sampling techniques. The disadvantage with convenience sampling is that the researcher would have no way of knowing if the sample chosen is representative of the target population.

Judgement Sampling This is a form of convenience sampling otherwise called as purposive sampling because the sample elements are chosen since it is expected that they can serve the research purpose. The sample elements are chosen based on the judgement that prevails in the researcher's mind about the prospective individual. The researcher may use his wisdom to conclude that a particular individual may be a representative of the population in which one is interested.

The distinguishing feature of judgment sampling is that the population elements are purposively selected. Again, the selection is not based on that they are representative, but rather because they

can offer the contributions sought. In judgement sampling, the researcher may be well aware of the characteristics of the prospective respondents, in order that, he includes the individual in the sample. It may be possible that the researcher has ideas and insights about the respondent's requisite experience and knowledge to offer some perspective on the research question.

Quota Sampling

Quota sampling is another non-probability sampling. It attempts to ensure that the sample chosen by the researcher is a representative by selecting elements in such a way that the proportion of the sample elements possessing a certain characteristic is approximately the same as the proportion of the elements with the characteristic in the population.

Quota sampling is viewed as two-staged restricted judgemental sampling technique. The first stage consists of developing control categories, or quotas, of population elements. Control characteristics involve age, sex, and race identified on the basis of judgement. Then the distribution of these characteristics in the target population is determined. For example, the researcher may use control categories in that, he/she intends to study 40% of men and 60% of women in a population. Sex is the control group and the percentages fixed are the quotas.

In the second stage, sample elements are selected based on convenience or judgement. Once the quotas have been determined, there is considerable freedom to select the elements to be included in the sample. For example, the researcher may not choose more than 40% of men and 60% of women in the study. Even if the researcher comes across qualified men after reaching the 40% mark, he/she would still restrict entry of men into the sample and keep searching for women till the quota is fulfilled.

Snowball Sampling

This is another popular non-probability technique widely used, especially in academic research. In this technique, 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 information provided by the selected group members. The group members may provide information based on their understanding about the qualification of the other prospective respondents. This method involves probability and non-probability methods. The initial respondents are chosen by a random method and the subsequent respondents are chosen by non-probability methods.

UNIT IV

DATA PREPARATION AND ANALYSIS

4.1DATA ANALYSIS AND INTERPRETATION

A researcher's important function is the appropriate interpretation of different types of statistical data with the help of his tools. The preliminary statistical work consists of collection, classification, tabulation, presentation and analysis of data. The most important part of the statistical work consists in the proper use of the statistical tools in the interpretation of data.

The most commonly used tools are 'Mean, Median, Mode; Geometric Mean, Measures of Dispersion such as Range; Mean Deviation, Standard Deviation and also other measures such as Coefficient of Correlation, Index Numbers etc. It is necessary to note that technical interpretation of data has to be combined with a high degree of sound judgement, statistical experience, skill and accuracy. After all figures do not lie, they are innocent. But figures obtained haphazardly, compiled unscientifically and analyzed incompetently would lead to general distrust in statistics by the citizens. It should be understood that "statistical methods are the most dangerous tools in the hands of an expert".

4.2 DATA EDITING AND CODING

Authenticity and relevance of a research investigation is based on the assurance of error-free qualitative reliability of the collected data. Data processing has to be carried out in an appropriate manner. Processing comprises the task of editing, coding classification and tabulation.

In spite of a careful collection by a researcher, there may be a possibility for errors of omission and commission arising and it is for this purpose that the process of editing becomes necessary.

The editor, while examining certain responses of the respondents, may find some mistakes in the form of incomplete, vague or irrelevant answers. Such inconsistent answers have to be eliminated or suitably and reasonably modified. Further, there should be no room for fictitious data to creep in. Hence the editor has to take care to see that the authenticity of the data is in a perfect shape.

For the purpose of classification of the data into meaningful and useful classes, the procedure of coding has to be used. This procedure would be advantageous in dealing with the data having a number of characteristics. Also, a large volume of data can be processed accurately.

Manual processing and analysis can be carried out by using measures of central tendency, dispersion, correlation regression and other statistical methods if the volume of data is not very large.

In case a researcher is confronted with a very large volume of data then it is imperative to use 'computer processing'. For this purpose necessary statistical packages such as SPSS etc. may be used. Computer technology can prove to be a boon because a huge volume of complex data can be processed speedily with greater accuracy.

4.3 INTERPRETATION OF DATA IN GENERAL MANAGEMENT AND SOCIAL SCIENCES

Data pertaining to economic, psychological sociological or managerial phenomena necessarily requires appropriate interpretation through the use of analytical procedures based on inductive or deductive logical reasoning. Further, proper statistical methods will have to applied for scientific analysis. Depending upon the nature of the data which may be nominal, ordinal, interval or ratio level, a researcher has to carefully evaluate the appropriateness and precision in the use of

'Parametric' or 'Non-parametric' tests of hypothesis. It may be noted that generally the nominal level data is weak whereas the ratio level data is comparatively strong.

Statistical analysis can be classified as (i) descriptive and (ii) inferential.

Descriptive data provides quantitative information for analytical interpretation for instance: with respect to the wage distribution of 500 workers in a factory, we can calculate various measures of central tendency, dispersion, skewness etc. Inferential data relates to statistical inference where conclusions are drawn on the basis of samples taken randomly from a population, which is assumed to be normal. Population parameters are estimated on the basis on the basis of sample statistics.

Depending upon the nature of researcher's problem, relevant sampling methods are used for obtaining data. However, for the purpose of hypothesis testing, parametric or non-parametric tests may be used depending upon the fact whether the assumptions in regard to population are based on 'distribution' or 'distribution-free characteristics'.

4.4 INTERPRETATION OF FINANCIAL RATIOS

Financial ratio analysis is a study of ratios between various items or groups of items in financial statements. Financial ratios can be broadly classified into the following categories:

1. Liquidity ratios

2. Leverage ratios

3. Turnover ratios

4. Profitability ratios

5. Valuation ratios

4.4.1 Liquidity Ratios

Liquidity refers to the ability of a firm to meet its obligations in the short run, usually one year. Liquidity ratios are generally based on the relationship between current assets and current liabilities.

The important liquidity ratios are:

(a) ***Current Ratio:*** Current assets include cash, current investments, debtors, inventories (stocks), loans and advances, and prepaid expenses. Current liabilities represent liabilities that are expected to mature in the next twelve months. These comprise (i) loans, secured or unsecured, that are due in the next twelve months and (ii) current liabilities and provisions. The current ratio thus measures the ability of the firm to meet its current liabilities.

(b) ***Acid-Test Ratio (also called the quick ratio):*** Quick assets are defined as current assets excluding inventories.

It is a fairly stringent measure of liquidity. It is based on those current assets, which are highly liquid. Inventories are excluded because they are deemed to be the least liquid component of the current assets.

(c) ***Cash Ratio:*** Because cash and bank balance and short term marketable securities are the most liquid assets of a firm.

4.4.2 Leverage Ratios

Financial leverage refers to the use of debt finance. While debt capital is a cheaper source of finance, it is also a riskier source of finance. Leverage ratios help in accessing the risk arising from the use of debt capital. Two types of ratios are commonly used to analyze financial leverage:

(i) Structural ratios

(ii) Coverage ratios

Structural ratios are based on the proportions of debt and equity in the financial structure of the firm. Coverage ratios show the relationship between debt serving commitments and sources for meeting these burdens.

The important structural ratios are:

(a) ***Debt-Equity Ratio:*** It shows the relative contributions of creditors and owners.

The numerator of this ratio consists of all debt, short-term as well as long-term, and the denominator consists of net worth plus preferential capital.

(b) ***Debt-Assets Ratio:*** It measures the extent to which borrowed funds support the firm's assets. The numerator of this ratio includes all debts, short-term as well long-term, and the denominator of this ratio is total of all assets.

(c) ***Interest Coverage Ratio (also called "times interest earned"):*** A high interest coverage ratio means that the firm can easily meet the interest burden even if profit before interest and taxes suffer a considerable decline. A low interest coverage ratio may result in financial embarrassment when profit before interest and taxes decline.

Though widely used, this ratio is not a very appropriate measure because the source of interest payment is cash flow before interest and taxes.

(d) ***Fixed Charges Coverage Ratio:*** This ratio shows how many times the cash flow before interest and taxes covers all fixed financing charges. In the denominator of this ratio, only the repayment of loan is adjusted upwards for the tax factor because the loan repayment amount, unlike interest, is not tax deductible.

(e) ***Debt Service Coverage Ratio***

4.4.3 Turnover Ratios

Turnover ratios also referred to as activity ratios or assets management ratios, measure how efficiently the assets are employed by a firm. The important turnover ratios are:

(a) ***Inventory Turnover:*** It measures how fast the inventory is moving through the firm and generating sales. It reflects the efficiency of inventory management.

(b) ***Debtors' Turnover:*** It shows how many times accounts receivable (debtors) turnover during the year.

(c) ***Average Collection Period:*** It represents the number of days' worth of credit sales that is locked in debtors.

(d) ***Fixed Assets Turnover:*** This ratio measures sales per rupee of investment in fixed assets.

This ratio is supposed to measure the efficiency with which fixed assets are employed.

(e) ***Total Assets Turnover:*** This ratio measures how efficiently assets are employed overall.

4.4.4 Profitability Ratios

They reflect the final result of business operations. There are two types of profitability ratios:

(i) Profit margin ratios

(ii) Rate of return ratios

The important profit margin ratios are:

(a) ***Gross Profit Margin Ratio:*** The ratio shows the margin left after meeting manufacturing costs. It measures the efficiency of the production as well as pricing.

(b) ***Net Profit Margin Ratio:*** This ratio shows the earnings left for shareholders as a percentage of net sales.

(c) ***Return on Total Assets:*** It is measure of how efficiently the capital is employed. To ensure internal consistency, the following variant of return on total assets may be employed:

(a) ***Earning Power:*** It is a measure of operating profitability.

(b) ***Return on Equity:*** it is a measure of great interest to equity shareholder. The numerator of this ratio is equal to profit after tax less preference dividends. The denominator includes all contributions made by equity shareholders. It is also called the return on net worth.

4.4.5 Valuation Ratios

Valuation ratios indicate how the equity stock of the company is assessed in the capital market:

(a) ***Price-earnings Ratio:*** The market price per share may be the price prevailing on a certain day or the average price over a period of time. The earnings per share are simply: profit after tax less preference divided by the number of outstanding equity shares.

(b) ***Yield:*** It is a measure of the rate of return earned by shareholders.

(c) ***Market Value to Book Value Ratio***

(d) ***'q' Ratio:*** Proposed by James Tobin, this ratio resembles the market value to book value ratio. However, there are two key differences:

(i) The numerator of the 'q' ratio represents the market value of equity as well as debt, not just equity.

(ii) The denominator of the' q' ratio represents all assets. Further, these assets are reckoned at their replacement cost, not book value.

4.5 CLASSIFICATION AND TABULATION

Classification is the process of sorting 'similar' things from among a group of objects with different characteristics. In other words, heterogeneous data is divided into separate homogeneous classes according to characteristics that exist amongst different individuals or quantities constituting the data. Thus, fundamentally classification is dependent upon similarities and resemblances among the items in the data.

The main object of classification is to present vividly, in a simplified and quickly intelligible form, a mass of complex data. Without condensing details in a classified form it is difficult to compare quickly, interpret thoroughly and analyse properly different sets of quantitative and qualitative phenomena. The basic requirements of good classification are stability, non-ambiguity, flexibility and comparability.

4.5.1 Descriptive and Quantitative Classification

Depending on the characteristics of the data, they can be broadly categorized into two separate and distinct groups - descriptive and numerical. Descriptive characteristics are those that can be described in words and are expressible in qualitative terms. Numerical characteristics are quantitative in nature. For instance, literacy, sex, caste and religion are descriptive characteristics. Height, weight, age, income and expenditure are numerically expressible characteristics. Descriptive or qualitative classification is termed classification according to attributes. Numerical or quantitative classification of data in certain class intervals is termed as

classification in terms of classes with certain intervals, or classification according to class intervals.

4.5.2 Simple and Manifold Classification

Classification based on attributes may be either simple or manifold. In the case of simple classification, only one attribute is studied. That is, the data is classified into two separate classes under a single attribute. For instance, data collected on literacy in the country can be classified into two distinct classes: literate and illiterate. Since this process is quite simple, it is known as simple classification.

On the other hand, analysing and classifying collected data under several attributes in different classes is called manifold classification. For example, if each of the two classes, literate and illiterate, is divided into males and females, then there would be four classes. If classified further on a regional basis, there would be a number of other classes. Such a process of classification of data into a number of classes and classes within classes is known as manifold classification.

4.5.3 Classification According to Class Intervals

Phenomena like income, heights and weights are all quantitatively measurable and data on them can be classified into separate class intervals of uniform length. For instance, the marks obtained by a group of 50 candidates in a subject at an examination can be classified into the following classes: 0-10, 10-20, 20-30, 30-40, 40-50, 50-60, 60-70 etc. Each class has a lower and an upper limit and the number of candidates getting marks between these two limits of the same class interval is called the frequency of the respective class. To give an example, if 12 candidates get between 40 and 50 marks, 12 is the frequency of the class 40-50.

Number of Classes

The number of classes into which particular data should be classified depends upon the mass of data. The larger the mass, the more should be the number of classes. Usually data is classified into not less than six classes and not more than 20 classes, depending upon the mass and size of the data and the length of the class intervals. The fundamental object of classifying data is to get the maximum possible amount of information most precisely. According to Sturges' Rule, the number of class intervals (n) = 1 + 3.322 log N, where N = total number of observations.

Length of Class Intervals

The uniform length of class intervals depends upon the difference between the extreme items in the data-the largest item and the smallest item-and the number of classes required. For example, if in the data on marks secured by 250 candidates in a subject at an examination, 0 and 93 are the lowest and highest marks respectively and 10 classes are required, each class would then have a class interval length of 10. Ordinarily class intervals are fixed in such a way as to enable easy calculation and precision.

Class Limits

The choice of class limits is determined by the mid-value of a class interval, which should as far as possible be identical with the arithmetic average of the items occurring in that class interval.

10.5.4 Tabulation

Tabulation is the process of arranging given quantitative data based on similarities and common characteristics in certain rows and columns so as to present the data vividly for quick intelligibility, easy comparability and visual appeal.

Components of a Statistical Table

A statistical table comprises a title, a head-note, a stub head and stub details, captions and columns under the captions, field of the table under different column heads, footnotes and, source notes.

Here's a sample:

Title: Students studying in different classes in X, Y, Z Commerce College.

Head-Note: Data relates to the academic year for ex.1998-99.

Purpose of Statistical Tables

Statistical tables are of two types: general purpose table and special purpose table.

1. ***General Purpose Table:*** This is primarily meant to present the entire original data on a subject. Such presentation of numerical data in a tabular form is especially useful as a source of information and reference for constructing different special

purpose tables.

2. ***Special Purpose Table:*** As its name implies, this is a statistical table that specially presents and emphasizes certain phases or significant aspects of the information given in a general purpose table. Presenting data in a special table not only makes it easy to understand specific data, it also facilitates easy comparison and clear-cut interpretation.

4.5.5 Types of Tabulation

1. ***One-way Table (single tabulation):*** A one-way table gives answers to questions about one characteristic of the data.

2. ***Two-way Table (double tabulation):*** A two-way table gives information about two interrelated characteristics of a particular type of data.

3. ***Three-way Table (Triple Tabulation):*** A three-way table answers questions relating to three interrelated characteristics of a given data.

4. ***Higher Order Table (Manifold Tabulation):*** This table gives information under several main heads and subheads on questions relating to a number of interrelated characteristics.

4.5.6 Rules and Precautions on Tabulation

1. Every statistical table should be given an appropriate title to indicate the nature of the data. The title should be simple, intelligible and unambiguous and should not be too lengthy or too short.

2. If necessary, the title may be further explained with a suitable head-note.

3. Different types of data require different types of tabulation. It has to be decided at the outset whether one or more tables would be necessary to fit in the data precisely and suitably. A single simple table is appealing to the eye provided it is prepared properly. Several tables or a large table make comparisons difficult.

4. The stub heads and the main heads should be consistent with the nature of the data and be very clear.

5. The main headings under the caption should be as few as possible in keeping with the requirements of space and type of data. If the main headings are few, comparison between different sets of data becomes easy.

6. The entire arrangement of data should be appropriate, compact and self-explanatory so that it is not necessary to rearrange the data in any manner.

7. Comparisons between different figures such as totals and averages-are easier if they are arranged vertically and not horizontally.

8. In order to show important parts of the data (under main heads) distinctly, it is necessary to draw thick double or multiple ruled lines.

9. Depending upon the nature of the data, items in the stub column may be arranged according to:

    (i) Alphabetical order.

    (ii) Geographical importance.

    (iii) Customary classification.

    (iv) Chronological order.

    (v) Size or magnitude.

10. Figures in the data that are estimates, approximate or revised should be indicated by an alphabet, asterisk, number or any other symbol. An explanation should be given in the footnote.

11. The different units used in the data should be indicated in the column heads. For example: 'figures in rupees', 'figures in metres', and so on.

12. The source of the data should be indicated under the footnote. It is necessary to mention the source for further references and other details and also for indicating the reliability of the data.

4.6 STATISTICAL DATA ANALYSIS

The data generated using the questionnaire is analysed and inference made out of the data could be used by the decision maker. The fundamental question that arises in the minds of the researcher is: “What technique should be used to analyse the collected data?”

The collected data may be coded as per the description given in the scaling lesson. The researcher should ensure that he/she does not deviate from the scaling principles enumerated in the scaling lesson. The researcher can create a master file containing the coded information of all the items included in the questionnaire.

The choice of technique to analyse the collected data could be pictorially represented as given in figure 11.1. Data analysis technique depends on the level of measurement and the type of sample the researcher uses. An overview of the choice of techniques used is given in figure 11.1. Descriptive statistics such as mode and relative and absolute frequencies are used on nominal data. Further chi-square test and Mcnemer test is used as inferential statistics. Ordinal data may be subjected to median and interquartile range. Under inferential statistics, non parametric techniques such as Kolmogorov Smirnov test, Mann Whitney test, Kruskal Wallis, and Friedman two- way ANOVA are used. Interval and ratio scale may be subjected to mean and standard deviation. Under inferential statistics, z test, t –test, one-way ANOVA, correlation and regression.

4.7 HYPOTHESIS TESTING

Basic analysis of the data involves testing of hypothesis. Lot of confusion prevails in developing a hypothesis. In simple terms, hypothesis refers to assumption of a relationship between two variables or difference between two or more groups. Hypothesis also contains the direction of relationship between the variables concerned.

Examples for hypothesis is given below:

(a) The purchasing power of the consumers is positively related to the availability of surplus income.

(b) Customers belonging to the Northern states in India have a different taste preference than those from Northern States.

Hypotheses are of two types: (a) Null hypothesis and (b) Alternative hypothesis. A simple rule may be followed to develop a hypothesis:

1. What we hope or expect to be able to conclude as a result of the test usually should be placed in alternative hypothesis.

2. The null hypothesis should contain a statement of equality (=) and an alternative hypothesis contains a > or < than sign.

3. The null is the hypothesis that is tested.

4. The null and alternate hypothesis are complementary.

4.8 HOW TO SELECT A PARTICULAR TEST

An appropriate statistical test for analysing a given set of data is selected on the basis of:

Scaling of the data: Is the measurement scale nominal, ordinal, interval or ratio;

Dependence, Independence of the measurements;

Types of samples: Independent or dependent samples;

Number of samples (groups) studied and;

Specific requirements such as sample size, shape of population distribution, are also used for considering the choice of a statistical test.

There are two types of samples: Independent and dependent samples. Two samples are independent sample if the sample selected from one of the populations has no effect or bearing on the sample selected from the other population. E.g., responses collected from Tamilians, Keralites, Kannadigas etc. They are exclusive groups of respondents where a Tamilian is exclusive in nature in that he does not take part in the other groups. Similarly, a Kannadiga is exclusive in nature in his membership in his group in that he does not take part in any other groups.

Dependent samples, also called related or correlated or matched samples, are ones in which the response of the nth subject in one sample is partly a function of the response of the nth subject in an earlier sample. Examples of dependent samples include before-during-after samples of the same people or matched response of similar people.

The nature of the samples is also considered while deciding on the appropriateness of the statistical test. The following are the conditions to be followed while choosing the tests:

Does the test involve one sample, two samples or k samples

If 2 samples or k samples are involved, are the individual cases independent or related.

The selection of an appropriate statistical test rests with two criteria:

(a) Type of scale used (Nominal, ordinal, interval or ratio)

(b) Type and the size of the samples. Type relates to whether the samples are independent or dependent.

The hypothesis of type two mentioned in the example above could be tested using two types of statistical tests. They are:

(a) Parametric tests

(b) Non-parametric tests

A simple understanding of the characteristics of the tests reveal that the term ‘parametric’ is derived from the term parameter which is a descriptive measure computed from or used to describe a population of data. Parametric tests are used to test hypothesis with interval and ratio measurements and non parametric tests are used to test hypothesis involving nominal and ordinal data. Parametric tests are more powerful than non–parametric tests. Explanation of parametric and non parametric tests in detail is beyond the scope of this study material.

There are few simple, easy to understand assumptions made while applying a parametric test. They are:

The observations must be independent – that is, the selection of any one case should not affect the chances for any other case to be included in the sample.

The observations should be drawn from normally distributed populations.

These populations should have equal variances.

The measurement scales should be at least interval so that arithmetic operations can be used with them.

Non-parametric tests do not have any assumptions of such kind. This is the advantage of non-parametric tests over parametric tests.

Hypothesis of the type 1 may be tested using Correlation and regression. Correlation is a test of association only between two variables. It uses only interval and ratio scale. Such correlations are called as Karl Pearson bi–variate correlation. Correlation of a special type employed on ordinal data is called Rank Correlation. This is otherwise called as Spearman Rank correlation. However, correlation will never tell the researcher about the independent – dependent relationship. Correlation analysis will give a result r called the correlation coefficient. R value ranges from -1 to +1 through a O. As r value approaches 1, the strength of the association increases and as it approaches 0, it decreases. R value will be associated with a positive or negative sign. Positive sign refers to positive correlation where the change in one variable causes change in the other variable in the same direction whereas a negative sign indicates inverse relationship.

Regression is a powerful technique dealing with two or more than two number of variables. Regression analysis will tell the researcher about the independent and dependent relationship. It deals with one dependent variable and any number of independent variables. Regression analysis involving only one independent variable, is called simple regression and that involves more than one independent variables is called multiple regression. Regression results in r^2 value which explains the amount of variance accounted for, by the independent variables on the dependent variable. Standardized β coefficient determines the strength and the direction of relationship between the independent and dependent variables.

UNIT V

REPORT DESIGN AND WRITING IN BUSINESS RESEARCH

5.1 INTRODUCTION

Much has been dealt in detail in the previous lesson about the processes involved in research. The researcher may be glued into the technicalities in doing a research, however, the research effort goes in vain, if it is reported in a systematic manner to concerned decision makers. The report should be presented in a way what the decision maker needs and wishes to know. The decision maker is interested only in the results rather than complicated tables and he/she should be convinced of the usefulness of the findings. He / she must have sufficient appreciation of the method to realize its strengths and weaknesses. Research report is the only one which communicates with the decision maker.

Research reports are the only tangible products of a research project and only

documentary evidence on which the decision maker can make decisions. Management decisions on the problem concerned are guided by the report and presentation. Moreover, the report should be meticulously presented as this would form part of a secondary data at a later stage. Any reference to this report should convey information in an unambiguous manner with clarity.

5.2 CRITERIA FOR REPORT WRITING

The research report should be made as per the requirement of the decision maker meaning that it should purely and simply tailor made for the decision maker with due regard for their technical sophistication, interest in the subject area, circumstances under which they will read the report, and use they will make of it. The report should be made keeping in mind the technical sophistication of the decision maker. A decision maker with little technical sophistication may

sometimes distort the inference that could be made from the result. Sometimes use of sophisticated technical jargons may result in the decision maker looking at the researcher with suspicion that he / she has used his high flair knowledge to prove his supremacy in the area of research.

The researcher may be confronted with a situation where the report he or she makes is meant for several others in the organization. In such a case, preparing a report that would satisfy everyone in the organization would be a tough task. In this regard, the researcher should have an understanding of the technical capacity and level of interest in the report by everyone concerned.

It may be appropriate if the researcher discusses the major findings, conclusions and recommendations with the decision makers before sitting down to prepare. Discussions before submission may prevent major discord among the targets to whom the research report is concerned. This would also result in the researcher knowing the needs of the concerned decision makers and ensures that the report meets the client's needs and finally the report is ultimately accepted. The discussion on the results should confirm specific dates for the delivery of the written report and other data.

5.3 REPORT FORMAT

Research formats may vary from researcher to researcher as well depending on the need of the decision maker. However, any researcher could not violate the fundamental contents a report should have. They should include the following:

i) Title page includes the title of the report, name, address and telephone number of the researcher or organization conducting the research, the name of the client for whom the report was prepared and the date of release.

ii) Letter of transmittal refers to a summary of the researcher's overall experience with the research, without mentioning the findings.

iii) Letter of authorization contains the authorization given by the decision maker to the researcher to do the project.

iv) Table of contents include the list of topics covered and appropriate page number.

v) Executive summary is important in a research report as this presents the report in a shortened form. Sometimes, the decision maker would read only this portion of the report when constrained by time. This should describe the problem, approach, and research design that was adopted. A small portion of the summary section should be devoted to the major results, conclusions and recommendations.

vi) Problem definition shows the background to the problem, highlights the discussion with the decision makers and industry experts and discusses the secondary data analysis, the qualitative research that was conducted, and the factors that were considered.

vii) Approach to the problem discusses the broad approach that was adopted in addressing the problem. This should contain a description of the theoretical foundations that guided the research, any analytical models formulated, research questions, hypothesis and the factors that influenced the research design.

viii) Research design shows the details of the nature of the research design adopted, information needed, data collection from secondary and primary sources, scaling techniques, questionnaire development and pretesting, sampling techniques, and field work.

ix) Data analysis describes the plan of the data analysis conducted on the data. It justifies the choice of the technique for a particular objective and hypothesis.

x) Results comprise of the results presented not only at the aggregate level but also at the subgroup level. The results, as mentioned earlier, should be presented in the most simpler way, enabling the decision maker to understand in the right sense.

xi) Limitations and Caveats contain the limitations caused by the research design, cost, time and other organizational constraints. However, a research should not contain many limitations. The researcher should have controlled many of the limitations during the research process.

xii) Conclusions and recommendations involve interpretation of the results in light of the problem being addressed to arrive at major conclusions. The decision maker makes decision based on the conclusion and recommendations of the researcher.

5.4 GUIDELINES FOR TABLES

Data analysed should be presented in the research report in a tabular form. The guidelines for tables are as follows:

i) Title and number should be given for every table such as 1a. The title should be very brief just explaining the description of the information provided in the table.

ii) Arrangement of data items indicate that the data should be arranged in some order either pertaining to time or data etc.

iii) Leaders, ruling and spaces should be made in such a way that they lead the eye horizontally, impart uniformity, and improve readability.

iv) Explanations and comments: explanations and comments clarifying the table may be provided in the form of captions, stubs and footnotes. Designations placed on the vertical columns are headings; those placed in the left-hand are called stubs. Information that cannot be incorporated in the table should be explained by footnotes.

v) Sources of the data refer to citing the source of secondary data used in the research.

5.5 GUIDELINES FOR GRAPHS

The researcher may have used graphical interpretation of the results. Use of graphs complements the textand the table adding clarity of communication and impact. The researcher may use any type of graphssuch as pie or round charts, line charts, pictographs, histograms and bar charts. While presenting the graphs, the researcher should ensure that each section or line or bar of the charts should be represented in different colours or shades.