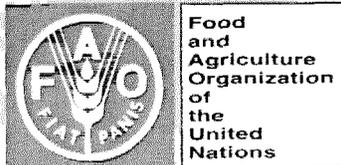


# MARKETING RESEARCH AND INFORMATION SYSTEMS





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**I.M. Crawford**

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
Rome, 1997

This publication has previously been issued as  
ISBN 92-851-1005-3  
by the FAO Regional Office for Africa.

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M-62  
ISBN 92-5-103905-4

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# Preface

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This textbook, Marketing Research And Information Systems, was prepared by staff of the Network and Centre for Agricultural Marketing Training in Eastern and Southern Africa. The Centre had the objective of strengthening agricultural marketing training in Eastern and Southern Africa. It was funded by the Government of Japan and executed by the Food and Agriculture Organization of the United Nations. Based in Zimbabwe, but also serving Kenya, Malawi, Tanzania and Zambia, the Project was able to draw upon the collective experience of eminent academics, government policy makers, experienced managers in agricultural marketing parastatals and pragmatic entrepreneurs from the private sector of agribusiness. The Project extended over a five year period, from May 1990 to August 1995, and during that time amassed a wealth of information on marketing practices within the food and agricultural sectors in the Sub-Saharan Region. In the first instance, this information was published, by the Project, as a series of proceedings from workshops and teaching manuals written by regional and international experts in the twin fields of food and agricultural marketing. It was decided that a distillation of original Project publications, supplemented by cases, illustrations and examples relevant to countries and other regions around the world, would contribute towards an understanding of the importance of marketing to agribusinesses worldwide.

## Marketing and agribusiness management series

This book is one of a series of texts prepared by the Network and Centre and has the intention of providing those charged with making marketing decisions in the food and agricultural sectors of the developing world in general, and the tropical regions in particular, with a foundation for better understanding customer motivations and market forces. There are four textbooks in the series. These are:

- Basic Finance For Marketers
- Agricultural And Food Marketing Management
- Global Agricultural Marketing Management, and
- Marketing Research And Information Systems.

These texts are primarily designed as an aid for those teaching marketing as it applies to food and agribusiness. The material is therefore relevant to students of agricultural marketing, agricultural economics, agribusiness, management and business studies. They are suitable for undergraduate and postgraduate degree courses, as well as vocational and in-service short courses.

## Features of the textbook

The learning process is assisted within the text through the provision of a number of learning aids. Each chapter has:

- Chapter objectives - an outline of its objectives in terms of what the reader can expect to learn from reading the particular chapter.

- Chapter summary - a summary which encapsulates the main points of the chapter. The summary should prove useful to students wishing to quickly revise the topics within the chapter.
- Key terms - the most important terms are listed at the end of each chapter and are intended to act as an aide-memoire.
- Review questions - each chapter concludes with a series of questions which readers can use to test their knowledge of the material contained within the chapter.
- References - other works upon which the author has drawn in writing this textbook are fully referenced as an aid to students seeking to extend their knowledge of a given topic.
- Glossary - at the end of the textbook there is a ready reference to the most important terms and concepts. The glossary should prove especially useful to those readers who are new to the subject of marketing since it gives a brief explanation of these terms.

## **Additional material**

The text is complemented by an additional set of learning and teaching aids. These include a tutor's manual and a set of overhead transparency masters.

## **Acknowledgements**

The author wishes to acknowledge the contribution of Ms. Sophie Tsoka who was responsible for the design and production of the visual material both in this textbook and the accompanying overhead transparency masters. Thanks are also due to Mr. Edward Seidler and Mr. Andrew Shepherd of FAO for their critical review of earlier drafts of the text. Lastly, the author takes this opportunity to express his gratitude to Kathryn Greenhalgh, Margaret Bowler and Diane Wallace for their painstaking work in proofreading the draft manuscript.

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# The Role Of Marketing Research

Chapter

1

In essence, management is about decision making. Decision is invariably surrounded by uncertainties and, therefore, risks. Marketing research is charged with helping to reduce such uncertainties. "...but will never remove it. At best, marketing research will increase the probability that the decisions which management has to take will help attain the organisation's marketing objectives.

## Chapter Objectives

The objectives of this chapter are to :

- Define the role of marketing research in decision making
- Outline the contents of a research brief
- Outline the contents of a research proposal, and
- Explain in detail each of the principal steps in research design.

## Structure Of The Chapter

This chapter begins by explaining the limitations of marketing research in so much that it serves to reduce rather than remove the risks attendant to decision making. The discussion proceeds to an outline of the research brief which has to be drawn up for the guidance of the individual or group charged with executing the study. At this point, the researcher has to respond to the brief with a research design. In this text an eight step research design is proposed and the reader will find a fairly thorough discussion of each of these steps within the chapter.

## The role and limitations of marketing research

"Marketing research does not make decisions and it does not guarantee success". Marketing managers may seek advice from marketing research specialists, and indeed it is important that research reports should specify alternative courses of action and the probability of success, where possible, of these alternatives. However, it is marketing managers who make the final marketing decision and not the researcher. The second observation, that marketing research does not guarantee success, is simply a recognition of the environment within which marketing takes place. In the fields of science and engineering researchers are often working with deterministic models of the world where  $y = f(x)$ . That is,  $x$  is a necessary and sufficient condition for  $y$  to occur. For instance, an increase in pressure is usually necessary and sufficient to bring about a rise in air temperature. In the social sciences, and this includes marketing and marketing research, the phenomenon under investigation rarely, if ever, lends itself to deterministic modelling. Consider the marketing problem of determining how much to spend on promotion in order to achieve a given market share. The link between promotional expenditure and sales is not so direct as that between pressure and temperature. There are a great many more intervening variables, including: the media used, the effectiveness of the promotional message, the length and frequency of the campaign, not to mention the many dimensions of the product, price and distribution. Marketing researchers work with probabilistic models of the form:

$$y = f(x_1) \dots f(x_2) \dots f(x_n) \dots$$

This reflects the fact that in order for a target market share to be reached some promotion (amount unknown) is **necessary** but will not be **sufficient**, on its own, to achieve the target.  $Y$  is a function of a number of variables and the interactions between them. The model is further complicated by the fact that these interactions are themselves often not understood. It is for these reasons that marketing researchers cannot guarantee that decisions based on their information will always prove 'successful'. Rather the best that a competent researcher and a well designed study will be able to offer is a reduction in the amount of uncertainty surrounding the decision.

## A definition of marketing research

Green and Tull<sup>1</sup> have defined marketing research as follows:

"Marketing research is the systematic and objective search for, and analysis of, information relevant to the identification and solution of any problem in the field of marketing."

The key words in this definition are; systematic, objective and analysis. Marketing research seeks to set about its task in a systematic and objective fashion. This means that a detailed and carefully designed research plan is developed in which each stage of the research is specified. Such a research plan is only considered adequate if it specifies: the research problem in concise and precise terms, the information necessary to address the problem, the methods to be employed in gathering the information and the analytical techniques to be used to interpret it.

Maintaining objectivity in marketing research is essential if marketing management is to have sufficient confidence in its results to be prepared to take risky decisions based upon those results. To this end, as far as possible, marketing researchers employ the scientific method. The characteristics of the scientific method are that it translates personal prejudices, notions and opinions into explicit propositions (or hypotheses). These are tested empirically. At the same time alternative explanations of the event or phenomena of interest are given equal consideration.

Not many years ago an agricultural engineering company developed an improved rice milling machine. The machine was introduced into Thailand where existing rice milling machines were of a design which resulted in a high percentage of brokens (broken kernels). The new rice mill produced a negligible percentage of brokens. Intuitively a successful product would be predicted, launched with hardly any need for marketing research when the new mill had such obvious advantages over existing products. The agricultural engineering company went through the expensive and time-consuming process of importing the machine into Thailand. They set up extensive distribution and servicing facilities only to be surprised when the mill failed to gain acceptance. In Thailand, smallholders take their rice to a miller.

Since they do not have sufficient cash to pay for milling their rice they get paid in 'brokens'. The miller then sells the 'brokens' for animal feed. The more effective milling machine simply did not fit into the Thai rice processing system. The company's assessment of the market was hardly objective. They saw the 'brokens' as a problem which their product solved. The prospective customer did not see it as a problem at all.

The third of the key terms in the definition given a little earlier was analytical. The marketing researcher's task goes beyond the collecting of data. He/she must also interpret the data in terms of what it means to the organisation which commissioned the research. Knowing that 60% of those interviewed thought that product A was superior to product B is, in itself, of little value. The organisation needs to know the alternative ways it can respond to this data. Data is equivalent to the raw materials of manufacturing; it has to be converted into information before it becomes useful in decision making. The process of converting data into information is achieved through analysis.

Although the need for precision and thoroughness in marketing research has been stressed here, it is to be remembered that, in practice, there is a perpetual conflict between the demands of expediency and the search for truth. The reality is that management is frequently under pressure to make timely decisions. Therefore management often seeks answers through marketing research in the shortest time possible and, moreover, at minimum cost. On such occasions its methods tend to be less theoretically rigorous and its analysis more superficial.

## **The market research brief**

Marketing research can be concerned with any of a variety of aspects of the market: the product, sales, buyer behaviour, promotion, distribution, pricing, packaging, etc. Since the researcher cannot investigate everything about a market, he/she must be selective. The question remains as to how the researcher decides where to focus the study, and to what depth each issue should be investigated. The answer should lie in a document called the research brief. The research design is a set of guidelines given to the researcher by the person(s) who have commissioned the research and/or the individual(s) who are to make use of the results in their decision making. The brief must inform the researcher which aspects of the market are particularly important. In particular, the research brief should include:

- the purpose of the research
- the objectives stated in a clear, concise, attainable, measurable and quantifiable way
- a time horizon
- a resource allocation, including the budget and facilities
- a reporting period.

Each of these components of the brief is explained in a little more detail in the section that follows.

## **The purpose of the research**

It is not at all unusual for marketing managers to neglect to tell the researcher the precise purpose of the research. They often do not appreciate the need to do so. Instead, they simply state what they think they need to know. This is not quite the same thing. To appreciate the difference consider the case of the marketing research agency which was contacted by the International Coffee Organisation (ICO) and asked to carry out a survey of young people in the age group 15-24. They wanted information on the coffee drinking habits of these young people: how much coffee they drank, at what times of day, with meals or between meals, instant or ground coffee, which other beverages they preferred and so on. In response, the research organisation developed a set of wide-ranging proposals which included taking a large random sample of young people.

In fact much of the information was interesting rather than important. Important information is that information which directly assists in making decisions and the ICO had not told the research company the purpose of the research. The initial reason for the study had been a suspicion, on the part of the ICO, that an increasing percentage of young people were consuming beverages other than coffee, particularly soft drinks, and simply never developed the coffee drinking habit. Had this been explained

to the research company then it is likely that their proposals would have been radically different. To begin with, the sample would have been composed of 15-24 year old non-coffee drinkers rather than a random sample of all 15-24 year olds. Second, the focus would have been non-coffee drinking habits rather than coffee drinking habits.

Unless the purpose of the research is stated in unambiguous terms it is difficult for the marketing researcher to translate the decision-maker's problem into a research problem and study design.

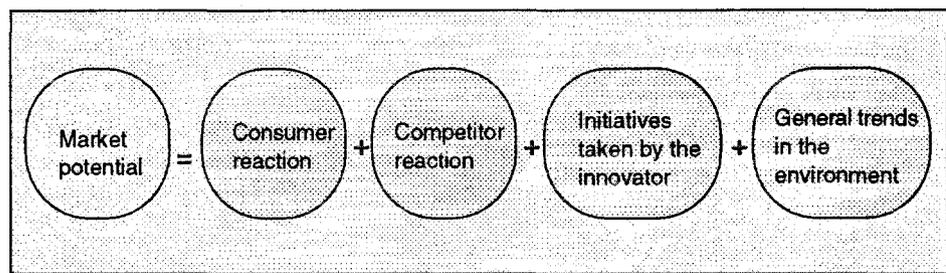
## Clear, concise, attainable, measurable and quantifiable objectives

Suppose that the marketing manager states that he needs to know the potential market for a new product his/her organisation has been developing. At first glance this might appear to meet all of the requirements of being clear, concise, attainable, measurable and quantifiable. In practice it would possibly meet only one of these criteria, i.e. it is concise!

Here is another case to be considered. A small engineering firm had purchased a prototype tree-lifter from a private research company. This machine was suitable for lifting semi-mature trees, complete with root-ball intact, and transplanting such trees in another location. It was thought to have potential in certain types of tree nurseries and plantations.

The problem with the objective is that the marketing manager needs to know the potential market for the new tree-lifter is that it is not attainable. One could find out how many tree-lifters were currently being sold but this is not the same as the objective set by the marketing manager. The market potential for any new brand is a function of at least 4 things, as shown in Figure 1.1.

**Figure 1.1 The components of market potential**



It was possible to test customer reaction to the concept of the new tree-lifter by showing pictures, line drawings and by supplying product specifications to prospective buyers. However, since the company had not decided their pricing policy an important element could not be tested. In large measure, it was also possible to gauge the likely reaction from competitors. The researchers began by looking at the basis of competition to determine whether it was on price, product quality or unique product features. The researchers were able to look at precedents. They examined the pattern of response on past occasions when one or other of those companies already in the market had launched a new product. An audit of the environment was undertaken too, but the missing component was the company's own plans for exploiting the market. Since the company had no involvement in the agricultural engineering sector, prior to acquiring the rights to the tree-lifter, they had no agreements with distributors, no idea of which, if any, of the distributors would be prepared to stock their product; they had no salesmen trained in selling into this industry and so on. The product's potential depended very much on such initiatives.

The solution would have been to undertake a study which would have described the market in detail in terms of customers, competitors and the environment. The company could then have put a marketing plan together and conducted a follow-up study to test their propositions out on the marketplace.

## The need to set a time horizon for marketing research

Inevitably there are deadlines which the marketing research activity must fit and these must be stated clearly at the outset of the research. As was said earlier, because of time pressures, management is often seeking quick answers from marketing research. If the researcher is aware of the time constraints then this will become an overriding factor when he/she plans the research design. He or she is likely to

put forward a design which is less elegant, and gives rise to less precise information but delivers the results on schedule.

## **A resource allocation, including the budget and facilities**

There are essentially two approaches to establishing the resource allocation to a particular marketing research exercise. Management can start with the problem and work out how much it will cost to solve it. Alternatively, they can decide how much the management can afford to spend, at the time, and seek the best answer they can for the time, money and manpower allocated. In practice the decision-makers prefer the latter approach and the researchers the former. In the end, some kind of compromise develops. The researcher rarely gets all of what he/she judges is required to reach a satisfactory conclusion but if the research proposal is well thought out and persuasively presented some concessions can be obtained.

Whichever the approach to resource allocation adopted, it is imperative that the researcher is aware of the financial and other constraints within which he/she must complete the work.

## **A reporting period**

The researcher must also know from the outset of the study the points in time when interim reports are required, if any, and the deadline for the final report. The form of interim reports should also be specified at the outset, whether verbal or written, and whether presentations are to be made to a group (nature and size of the group) or an individual.

In addition there are several characteristics of a good research brief and these are that it :

- means the same thing to all concerned
- does not ask for irrelevant information
- defines the relevant populations to be measured
- identifies the correct variables to be measured
- specifies the degree of accuracy really needed within the main results
- specifies an order of priorities when the sample has to be broken down for the purposes of analysing data for subgroups, and
- does not pre-judge the selection of research techniques and procedures.

## **The research proposal**

Having received the research brief, the researcher responds with a research proposal. This is a document which develops after having given careful consideration to the contents of the research brief. The research proposal sets out the research design and the procedures to be followed. The eight steps are set out in figure 1.2. These are only briefly discussed here since the remainder of this textbook consists of a detailed explanation of each step.

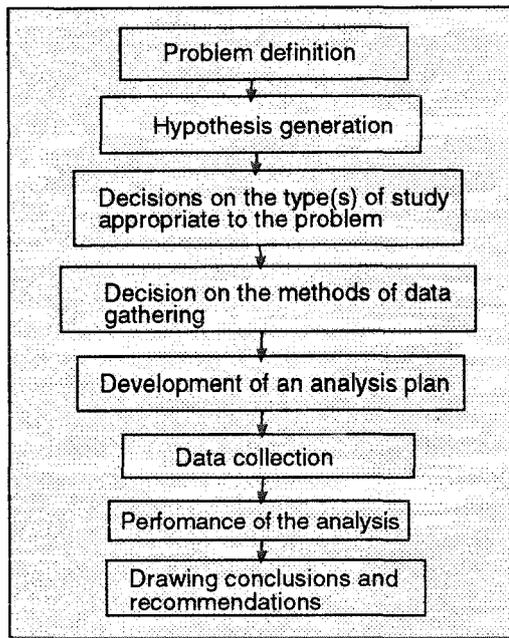


Figure 1.2 The research design

### Step 1: Problem definition

The point has already been made that the decision-maker should clearly communicate the purpose of the research to the marketing researcher but it is often the case that the objectives are not fully explained to the individual carrying out the study. Decision-makers seldom work out their objectives fully or, if they have, they are not willing to fully disclose them. In theory, responsibility for ensuring that the research proceeds along clearly defined lines rests with the decision-maker. In many instances the researcher has to take the initiative.

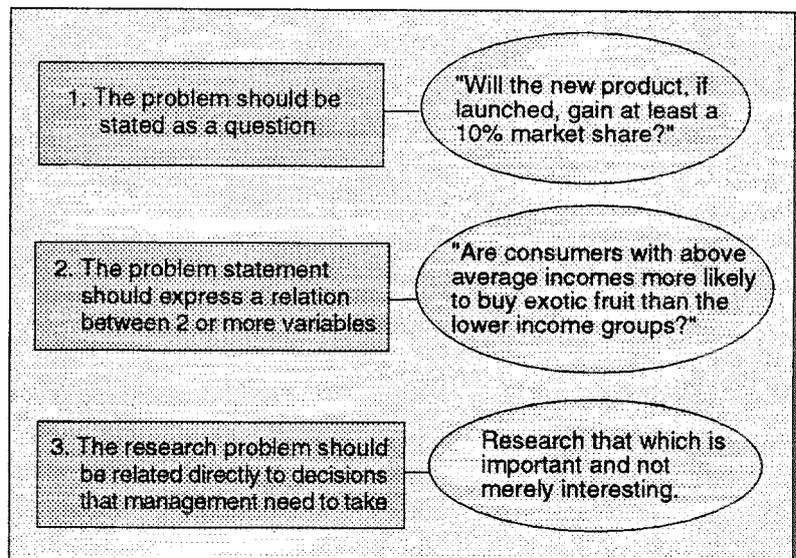
In situations, in which the researcher senses that the decision-maker is either unwilling or unable to fully articulate the objectives then he/she will have to pursue an indirect line of questioning. One approach is to take the problem statement supplied by the decision-maker and to break this down into key components and/or terms and to explore these with the decision-maker. For example, the decision-maker could be asked what he has in mind when he uses the term market potential. This is a legitimate question since the researcher is charged with the responsibility to develop a research design which will provide the right kind of information. Another approach is to focus the discussions with the person commissioning the research on the decisions which would be made given alternative findings which the study might come up with. This process frequently proves of great value to the decision-maker in that it helps him think through the objectives and perhaps select the most important of the objectives.

Whilst seeking to clarify the objectives of the research it is usually worthwhile having discussions with other levels of management who have some understanding of the marketing problem and/or the surrounding issues. Other helpful procedures include brainstorming, reviews of research on related problems and researching secondary sources of information as well as studying competitive products. Kerlinger<sup>2</sup> suggests that a well-defined marketing research problem tends to have three common characteristics as shown in figure 1.3.

### Step 2: Hypothesis generation

Whilst it is true that the purpose of research is to address some question, nonetheless one does not test research questions directly. For example, there may be interest in answering the question : "Does a person's level of education have any bearing upon whether or not he/she adopts new products?" Or, "Does a person's age bear any relation to brand loyalty behaviour ?". Research questions are too broad to be directly testable. Instead, the question is reduced to one or more hypotheses implied by these questions.

**Figure 1.3 Characteristics of a sound definition of the research problem**



A hypothesis is a conjectural statement regarding the relation between two or more variables. There are two key characteristics which all hypotheses must have: they must be statements of the relationship between variables and they must carry clear implications for testing the stated relations. These characteristics imply that it is relationships, rather than variables, which are tested; the hypotheses specify how the variables are related and that these are measurable or potentially measurable. Statements lacking any or all of these characteristics are not research hypotheses. For example, consider the following hypothesis:

"Red meat consumption increases as real disposable incomes increase."

This is a relation stated between one variable, "red meat consumption", and another variable, "disposable incomes". Moreover, both variables are potentially measurable. The criteria have been met. However for the purposes of statistical testing it is more usual to find hypotheses stated in the so-called null form, e.g.

"There is no relationship between red meat consumption and the level of disposable incomes."

Consider a second hypothesis:

"There is no relationship between a farmer's educational level and his degree of innovativeness with respect to new farming technologies."

Again there is a clear statement of the relationship being investigated but there are question marks over the measurability with respect to at least one of the variables i.e. "...a farmer's degree of innovativeness." We may also encounter difficulties in agreeing an appropriate measure of the other variable, i.e. "level of education". If these problems can be resolved then we may indeed have a hypothesis.

Hypotheses are central to progress in research. They will direct the researcher's efforts by forcing him/her to concentrate on gathering the facts which will enable the hypotheses to be tested. The point has been made that it is all too easy when conducting research to collect "interesting data" as opposed to "important data". Data and questions which enable researchers to test explicit hypotheses are important. The rest are merely interesting.

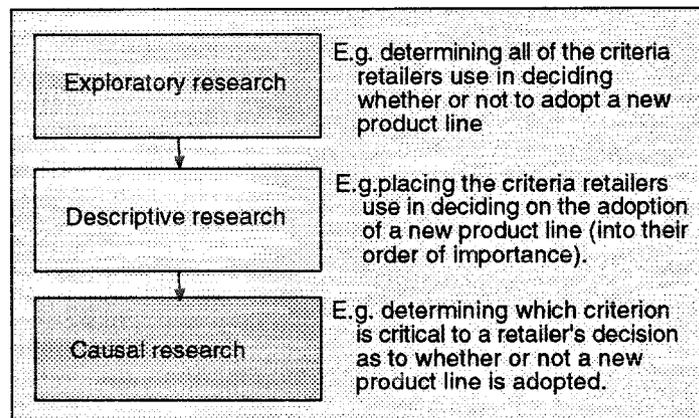
There is a second advantage of stating hypotheses, namely that implicit notions or explanations for events become explicit and this often leads to modifications of these explanations, even before data is collected.

On occasion a given hypotheses may be too broad to be tested. However, other testable hypotheses may be deduced from it. A problem really cannot be solved unless it is reduced to hypothesis form, because a problem is a question, usually of a broad nature, and is not directly testable.

### Step 3: Decision on type of study

Marketing research can be carried out on one of three levels: exploratory, descriptive or causal.

**Figure 1.4 Three types of marketing research study**



**Exploratory research:** The chief purpose of exploratory research is to reach a better understanding of the research problem. This includes helping to identify the variables which should be measured within the study. When there is little understanding of the topic it is impossible to formulate hypotheses without some exploratory studies. For example, crop residues such as straw are high in lignin (a wood-like substance) and low in nutrients. This makes them a poor animal feed since the lignin acts against digestibility and the low nutrient content means poor food value. However, if treated in a strong alkali, plus a little heat, the lignin breaks down and the nutrient content increases. A company was established to exploit this technology and did so successfully for 4 seasons. After this period sales began to slow down. Three other manufacturers had entered the market by this time. The company, Animal Feed Systems, did not know whether the whole industry had slowed down or if only their product was suffering. Nor did they know if the problem was temporary in that perhaps the market comprised of "early adopters" had been saturated but it was only a matter of time before other farmers began to buy their systems when they saw how well they worked. It was also possible that if a problem did exist it could lie in any one of a number of areas: animal populations might be declining, distributors may not be promoting the product aggressively, customers may be experiencing difficulties in getting the chemicals, and so on and on.

This is a good example of a situation where insufficient knowledge prevented the development of clear objectives, since the problem could not be articulated with any precision and therefore research of an exploratory nature was required. Such research can take the form of literature searches, informal personal interviews with distributors and users/non-users of the product and/or focus group interviews with farmers and/or distributors.

Exploratory research is intended to help researchers formulate a problem in such a way that it can be researched and suggest testable hypotheses.

**Descriptive research:** As the name suggests, descriptive research is concerned with describing market characteristics and/or marketing mix characteristics. Typically, a descriptive study specifies the number and size of market segments, the alternative ways in which products are currently distributed, listing and comparison of the attributes and features of competitive products, etc.

This type of study can involve the description of the extent of association between variables. For example, the researcher may observe that there is an association between the geographical location of consumers and their tendency to consume red meat. Note that the researcher is able to describe the relationship rather than explain it. Nonetheless if the relationship between the two is fairly stable this descriptive information may be sufficient for the purposes of prediction. The researcher may, for example, be able to predict how fast the per capita consumption of red meat is likely to rise over a given time period.

The principal difference between exploratory and descriptive research is that, in the case of the latter, specific research questions have been formulated before the research is undertaken. When descriptive research is conducted the researcher must already know a great deal about the research

problem, perhaps because of a prior exploratory study, and is in a position to clearly define what he/she wants to measure and how to do it.

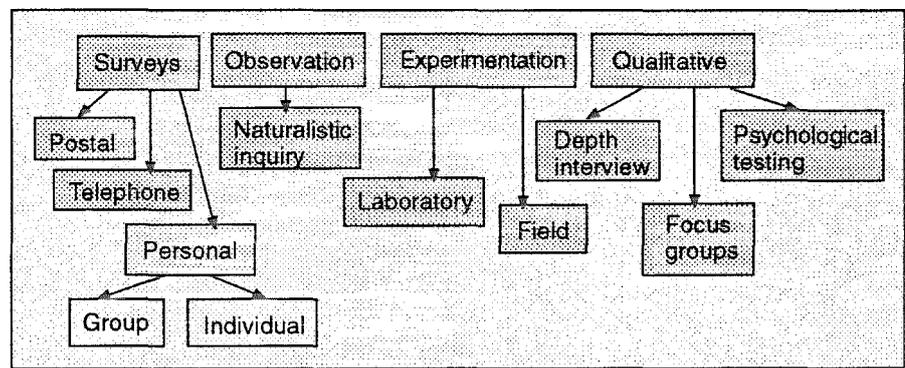
**Causal research:** Causal research deals with the "why" questions. That is, there are occasions when the researcher will want to know why a change in one variable brings about a change in another. If he/she can understand the causes of the effects observed then our ability to predict and control such events is increased.

In summary then there are three distinct types of marketing research study: exploratory, descriptive and causal. The purpose of each is summarised in figure 1.4. In some cases, a research programme will be of one kind or another, but in other instances these three typologies will represent phases within a single marketing research investigation.

### Step 4: Decision on data collection method

The next set of decisions concerns the method(s) of data gathering to be employed. The main methods of data collection are secondary data searches, observation, the survey, experimentation and consumer panels. Each of these topics is dealt with later on, so they are simply noted here.

**Figure 1.5 Data collection methods**



### Step 5: Development of an analysis plan

Those new to marketing research often intuitively believe that decisions about the techniques of analysis to be used can be left until after the data has been collected. Such an approach is ill-advised. Before interviews are conducted the following checklist should be applied:

- Is it known how each and every question is to be analysed? (e.g. which univariate or bivariate descriptive statistics, tests of association, parametric or nonparametric hypotheses tests, or multivariate methods are to be used? )
- Does the researcher have a sufficiently sound grasp of these techniques to apply them with confidence and to explain them to the decision-maker who commissioned the study?
- Does the researcher have the means to perform these calculations? (e.g. access to a computer which has an analysis program which he/she is familiar with? Or, if the calculations have to be performed manually, is there sufficient time to complete them and then to check them?)
- If a computer program is to be used at the data analysis stage, have the questions been properly coded?
- Have the questions been scaled correctly for the chosen statistical technique? (e.g. a t-test cannot be used on data which is only ranked)

There is little point in spending time and money on collecting data which subsequently is not or cannot be analysed. Therefore consideration has to be given to issues such as these before the fieldwork is undertaken.

## Step 6: Data collection

At this stage the researcher is ready to go into the field and collect data. The various issues relating to data collection constitute the main body of the text and therefore, are not dwelt upon here.

## Step 7: Analysis of data

The word 'analysis' has two component parts, the prefix 'ana' meaning 'above' and the Greek root 'lysis' meaning 'to break up or dissolve'. Thus data analysis can be described as:

"...a process of resolving data into its constituent components, to reveal its characteristic elements and structure."

Where the data is quantitative there are three determinants of the appropriate statistical tools for the purposes of analysis. These are the number of samples to be compared, whether the samples being compared are independent of one another and the level of data measurement.

Suppose a fruit juice processor wishes to test the acceptability of a new drink based on a novel combination of tropical fruit juices. There are several alternative research designs which might be employed, each involving different numbers of samples.

Test A	Comparing sales in a test market and the market share of the product it is targeted to replace.	Number of samples = 1
Test B	Comparing the responses of a sample of regular drinkers of fruit juices to those of a sample of non-fruit juice drinkers to a trial formulation.	Number of samples = 2
Test C	Comparing the responses of samples of heavy, moderate and infrequent fruit juice drinkers to a trial formulation.	Number of samples = 3

The next consideration is whether the samples being compared are dependent (i.e. related) or independent of one another (i.e. unrelated). Samples are said to be dependent, or related, when the measurement taken from one sample in no way affects the measurement taken from another sample. Take for example the outline of test B above. The measurement of the responses of fruit juice drinkers to the trial formulation in no way affects or influences the responses of the sample of non-fruit juice drinkers. Therefore, the samples are independent of one another. Suppose however a sample were given two formulations of fruit juice to taste. That is, the same individuals are asked first to taste formulation X and then to taste formulation Y. The researcher would have two sets of sample results, i.e. responses to product X and responses to product Y. In this case, the samples would be considered dependent or related to one another. This is because the individual will make a comparison of the two products and his/her response to one formulation is likely to affect his/her reaction or evaluation of the other product.

The third factor to be considered is the levels of measurement of the data being used. Data can be nominal, ordinal, interval or ratio scaled. Table 1.1 summarises the mathematical properties of each of these levels of measurement.

Once the marketing researcher knows how many samples are to be compared, whether these samples are related or unrelated to one another and the level of measurement then the selection of the appropriate statistical test is easily made. To illustrate the importance of understanding these connections consider the following simple, but common, question in marketing research. In many instances the age of respondents will be of interest. This question might be asked in either of the two following ways:

Please indicate to which of the following age categories you belong-

15 - 21 years   
22 - 30 years   
Over 30 years

(a)

How old are you?  Years

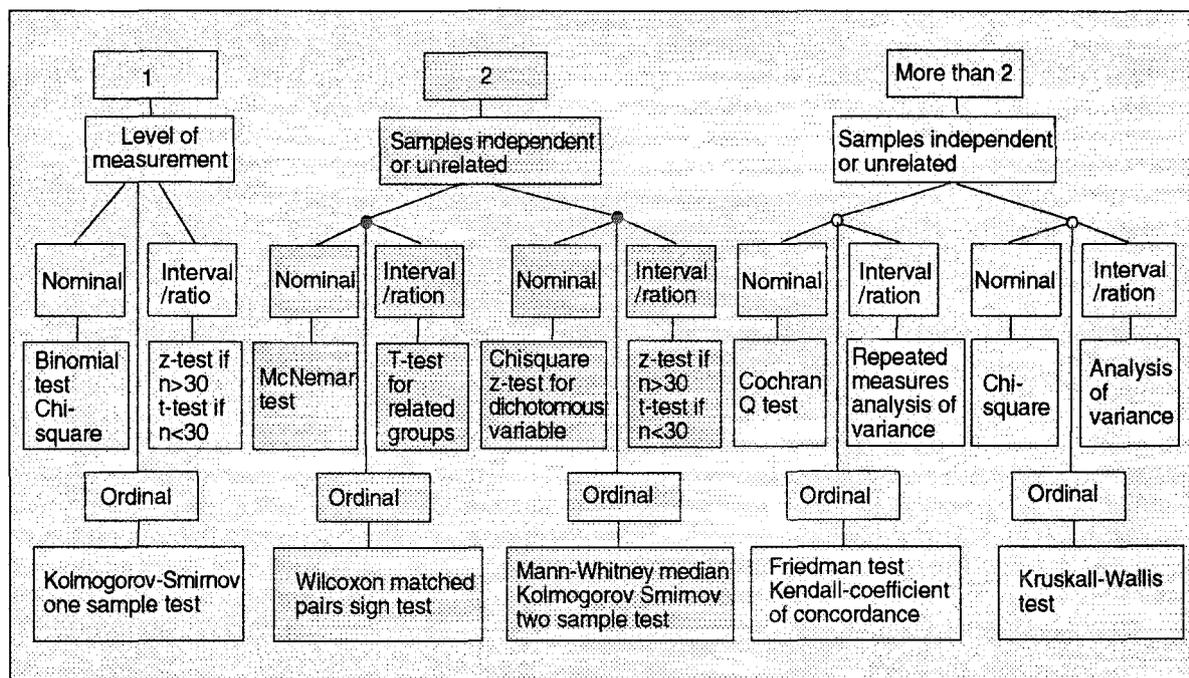
(b)

Measurement scale	Measurement Level	Examples	Mathematical properties
Nominal	Frequency counts	Producing grading categories	Confined to a small number of tests using the mode and frequency
Ordinal	Ranking of items	Placing brands of cooking oil in order of preference	Wide range of nonparametric tests which test for order
Interval	Relative differences of magnitude between items	Scoring products on a 10 point scale of like/dislike	Wide range of parametric tests
Ratio	Absolute differences of magnitude	Stating how much better one product is than another in absolute terms.	All arithmetic operations

**Table 1.1**  
**Levels of measurement**

Choosing format (a) would give rise to nominal (or categorical) data and format (b) would yield ratio scaled data. These are at opposite ends of the hierarchy of levels of measurement. If by accident or design format (a) were chosen then the analyst would have only a very small set of statistical tests that could be applied and these are not very powerful in the sense that they are limited to showing association between variables and could not be used to establish cause-and-effect. Format (b), on the other hand, since it gives the analyst ratio data, allows all statistical tests to be used including the more powerful parametric tests whereby cause-and-effect can be established, where it exists. Thus a simple change in the wording of a question can have a fundamental effect upon the nature of the data generated. Figure 1.6 provides a useful guide to making that final selection.

**Figure 1.6** Selecting statistical tests



The individual responsible for commissioning the research may be unfamiliar with the technicalities of statistical tests but he/she should at least be aware that the number of samples, their dependence or independence and the levels of measurement does affect how the data can be analysed. Those who submit marketing research proposals involving quantitative data should demonstrate an awareness of the factors that determine the mode of analysis and a capability to undertake such analysis.

Marketing researchers have to plan ahead for the analysis stage. It often happens that data processing begins whilst the data gathering is still underway. Whether the data is to be analysed manually or through the use of a computer program, data can be coded, cleaned (i.e. errors removed) and the proposed analytical tests tried out to ensure that they are effective before all of the data has been collected.

Another important aspect relates to logistics planning. This includes ensuring that once the task of preparing the data for analysis has begun there is a steady and uninterrupted flow of completed data forms or questionnaires back from the field interviewers to the data processors. Otherwise the whole exercise becomes increasingly inefficient. A second logistical issue concerns any plan to build up a picture of the pattern of responses as the data comes flowing in. This may require careful planning of the sequencing of fieldwork. For instance, suppose that research was being undertaken within a particular agricultural region with a view to establishing the size, number and type of milling enterprises which had established themselves in rural areas following market liberalisation. It may be that the West of the district under study mainly wheat is grown whilst in the East it is maize which is the major crop. It would make sense to coordinate the fieldwork with data analysis so that the interim picture was of either wheat or maize milling since the two are likely to differ in terms of the type of mill used (e.g. hammer versus plate mills) as well as screen sizes and end use (e.g. the proportions prepared for animal versus human food).

## **Step 8: Drawing conclusions and making recommendations**

The final chapter of this textbook is devoted to the topic of report writing. However, it is perhaps worth noting that the end products of marketing research are conclusions and recommendations. With respect to the marketing planning function, marketing research helps to identify potential threats and opportunities, generates alternative courses of action, provides information to enable marketing managers to evaluate those alternatives and advises on the implementation of the alternatives.

Too often marketing research reports chiefly comprise a lengthy series of tables of statistics accompanied by a few brief comments which verbally describe what is already self-evident from the tables. Without interpretation, data remains of potential, as opposed to actual use. When conclusions are drawn from raw data and when recommendations are made then data is converted into information. It is information which management needs to reduce the inherent risks and uncertainties in management decision making.

Customer oriented marketing researchers will have noted from the outset of the research which topics and issues are of particular importance to the person(s) who initiated the research and will weight the content of their reports accordingly. That is, the researcher should determine what the marketing manager's priorities are with respect to the research study. In particular he/she should distinguish between what the manager:

- must know
- should know
- could know

This means that there will be information that is essential in order for the marketing manager to make the particular decision with which he/she is faced (must know), information that would be useful to have if time and resources within the budget allocation permit (should know) and there will be information that it would be nice to have but is not at all directly related to the decision at hand (could know). In writing a research proposal, experienced researchers would be careful to limit the information which they firmly promise to obtain, in the course of the study, to that which is considered 'must know' information. Moreover, within their final report, experienced researchers will ensure that the greater part of the report focuses upon 'must know' type information.

## **Chapter Summary**

Marketing research serves marketing management by providing information which is relevant to decision making. Marketing research does not itself make the decisions, nor does it guarantee success. Rather, marketing research helps to reduce the uncertainty surrounding the decisions to be made. In order to do so effectively, marketing research has to be systematic, objective and analytical.

The manager or other individual initiating the research must provide guidance to the researcher in the form of a research brief. This document should state the purpose of the research, its objectives, the time by which it must be completed, the budget to which the researcher must work in developing the research design and the timing and frequency of any interim reports which the researcher is expected to make.

Having read, questioned and understood the research brief the onus is then upon the marketing researcher to respond by preparing the research design. Research design begins with an accurate and, as far as is possible, precise definition of the problem. This is followed by the generation of hypotheses. There will then be an intermediate stage whereby the hypotheses are restated in a testable form, i.e. the null form. This will probably only be done if it is intended that statistical analysis is to be undertaken. Where the research is more qualitative in nature then it is still recommended that hypotheses should be developed. These should include alternative hypotheses; depending upon what is already known about the research problem one of three types of study might be undertaken, i.e. an exploratory study, a descriptive study or a causal study. Before proceeding further, the researcher has to develop an analysis plan. It is only when the analysis plan has been considered that fieldwork, in the form of data collection, should be undertaken. The final step in the research design would be to write the report. Customer oriented marketing researchers will have noted from the outset of the research which topics and issues are of particular importance to the person(s) who initiated the research and will weight the content of their reports accordingly.

## Key Terms

Analysis plan	Exploratory research	Ordinal Scales	Research design
Causal research	Hypotheses	Primary research	Research proposal
Continuous research	Interval scales	Ratio scales	Secondary research
Descriptive research	Nominal scales	Research brief	

## Review Questions

From your knowledge of the material in this chapter, give brief answers to the following questions below.

1. Name the 3 key words used in the definition of marketing research by Green, Tull and Albaum.
2. Define the term 'hypothesis'.
3. What are the 3 types of research described in this chapter?
4. What are the main items of information which should be included in a research brief?
5. Name the 3 factors which determine which is the appropriate statistical test to conduct on data obtained from a random sample.
6. What is the aim of exploratory research?
7. Name 4 characteristics of a good research brief.
8. Why is it important to devise a data analysis plan before collecting the data?

## Chapter References

1. Green, P.E., Tull, D.S. and Albaum, G . (1993), *Research For Marketing Decisions*, 5th edition, Prentice-Hall
2. Kerlinger, FN.(1994) *Foundations of Behavioural Research*, 1st edition, Holt, Rinehart and Winston, p.174.

# Secondary Sources Of Information

## Chapter

## 2

Marketing information must be timely, organised, useful and in a simple form if it is to ease decision making. It should also be easily manipulated to satisfy the changing and ad hoc requirements of management for information. There is more to marketing information than marketing research. Indeed, marketing research is a subsystem of the marketing information system. A Marketing Information System (MIS) is a structure within an organisation designed to gather, process and store data from the organisation's external and internal environment and to disseminate this in the form of information to the organisation's marketing decision makers. The activities performed by an MIS and its subsystems include information discovery, collection, interpretation (which may involve validation and filtering), analysis, and intra-company dissemination (storage, transmission, and/or dumping).

### Chapter Objectives

The objectives of this chapter are :

- To convince the reader of the benefits of beginning any marketing research with a thorough search of secondary sources of data
- To articulate the advantages of secondary data
- To highlight the potential errors which can be hidden within secondary data
- To outline some of the main internal and external sources of data available to commercial enterprises, and
- To help the reader to recognise the transition, in marketing research, from a dependence upon published sources of secondary data to electronically stored secondary data.

### Structure Of The Chapter

At the outset of the chapter a strong case is made for studying secondary data before engaging in primary research. The potential benefits of beginning any study with secondary data are outlined, including the prospect that in some cases possession of relevant secondary data may obviate the need for primary research to be undertaken at all. This discussion is followed by an overview of the questions that should be asked when evaluating secondary sources and data in terms of their validity and accuracy. Thereafter, the principal internal and external sources of secondary data are described. The final section of this chapter briefly points towards future developments in the storage and retrieval of secondary data. Mention is made of electronic systems like the Internet and CD-ROMs.

## The nature of secondary sources of information

Secondary data is data which has been collected by individuals or agencies for purposes other than those of our particular research study. For example, if a government department has conducted a survey of, say, family food expenditures, then a food manufacturer might use this data in the organisation's evaluations of the total potential market for a new product. Similarly, statistics prepared by a ministry on agricultural production will prove useful to a whole host of people and organisations, including those marketing agricultural supplies.

No marketing research study should be undertaken without a prior search of secondary sources (also termed desk research). There are several grounds for making such a bold statement.

- Secondary data may be available which is entirely appropriate and wholly adequate to draw conclusions and answer the question or solve the problem. Sometimes primary data collection simply is not necessary.
- It is far cheaper to collect secondary data than to obtain primary data. For the same level of research budget a thorough examination of secondary sources can yield a great deal more information than can be had through a primary data collection exercise.
- The time involved in searching secondary sources is much less than that needed to complete primary data collection.
- Secondary sources of information can yield more accurate data than that obtained through primary research. This is not always true but where a government or international agency has undertaken a large scale survey, or even a census, this is likely to yield far more accurate results than custom designed and executed surveys when these are based on relatively small sample sizes.
- It should not be forgotten that secondary data can play a substantial role in the exploratory phase of the research when the task at hand is to define the research problem and to generate hypotheses. The assembly and analysis of secondary data almost invariably improves the researcher's understanding of the marketing problem, the various lines of inquiry that could or should be followed and the alternative courses of action which might be pursued.
- Secondary sources help define the population. Secondary data can be extremely useful both in defining the population and in structuring the sample to be taken. For instance, government statistics on a country's agriculture will help decide how to stratify a sample and, once sample estimates have been calculated, these can be used to project those estimates to the population.

## The problems of secondary sources

Whilst the benefits of secondary sources are considerable, their shortcomings have to be acknowledged. There is a need to evaluate the quality of both the source of the data and the data itself. The main problems may be categorised as follows:

### Definitions

The researcher has to be careful, when making use of secondary data, of the definitions used by those responsible for its preparation. Suppose, for example, researchers are interested in rural communities and their average family size. If published statistics are consulted then a check must be done on how terms such as "family size" have been defined. They may refer only to the nucleus family or include the extended family. Even apparently simple terms such as 'farm size' need careful handling. Such figures may refer to any one of the following: the land an individual owns, the land an individual owns plus any additional land he/she rents, the land an individual owns minus any land he/she rents out, all of his land or only that part of it which he actually cultivates. It should be noted that definitions may change over time and where this is not recognised erroneous conclusions may be drawn. Geographical areas may have their boundaries redefined, units of measurement and grades may change and imported goods can be reclassified from time to time for purposes of levying customs and excise duties.

**Measurement error** When a researcher conducts fieldwork she/he is possibly able to estimate inaccuracies in measurement through the standard deviation and standard error, but these are sometimes not published in secondary sources. The only solution is to try to speak to the individuals involved in the collection of the data to obtain some guidance on the level of accuracy of the data.

The problem is sometimes not so much 'error' but differences in levels of accuracy required by decision makers. When the research has to do with large investments in, say, food manufacturing, management will want to set very tight margins of error in making market demand estimates. In other cases, having a high level of accuracy is not so critical. For instance, if a food manufacturer is merely assessing the prospects for one more flavour for a snack food already produced by the company then there is no need for highly accurate estimates in order to make the investment decision.

**Source bias** Researchers have to be aware of vested interests when they consult secondary sources. Those responsible for their compilation may have reasons for wishing to present a more optimistic or pessimistic set of results for their organisation. It is not unknown, for example, for officials responsible for estimating food shortages to exaggerate figures before sending aid requests to potential donors. Similarly, and with equal frequency, commercial organisations have been known to inflate estimates of their market shares.

**Reliability** The reliability of published statistics may vary over time. It is not uncommon, for example, for the systems of collecting data to have changed over time but without any indication of this to the reader of published statistics. Geographical or administrative boundaries may be changed by government, or the basis for stratifying a sample may have altered.

Other aspects of research methodology that affect the reliability of secondary data is the sample size, response rate, questionnaire design and modes of analysis.

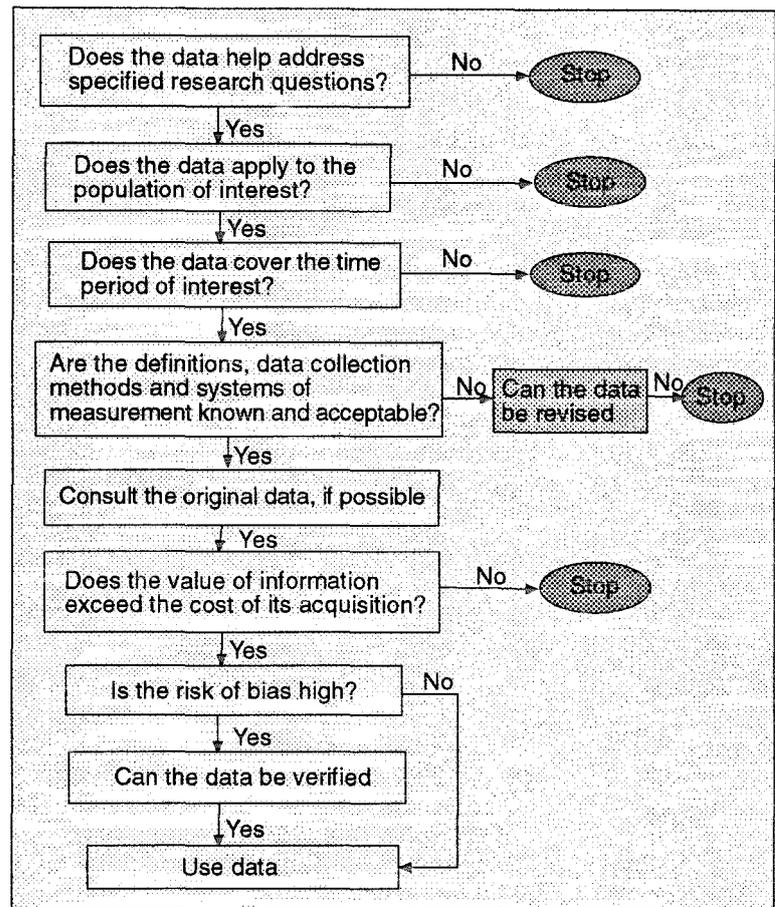
**Time scale** Most censuses take place at 10 year intervals, so data from this and other published sources may be out-of-date at the time the researcher wants to make use of the statistics.

The time period during which secondary data was first compiled may have a substantial effect upon the nature of the data. For instance, the significant increase in the price obtained for Ugandan coffee in the mid-90's could be interpreted as evidence of the effectiveness of the rehabilitation programme that set out to restore coffee estates which had fallen into a state of disrepair. However, more knowledgeable coffee market experts would interpret the rise in Ugandan coffee prices in the context of large scale destruction of the Brazilian coffee crop, due to heavy frosts, in 1994, Brazil being the largest coffee producer in the world.

Whenever possible, marketing researchers ought to use multiple sources of secondary data. In this way, these different sources can be cross-checked as confirmation of one another. Where differences occur an explanation for these must be found or the data should be set aside.

Figure 2.1 presents a flowchart depicting the decision path that should be followed when using secondary data. As can be seen, the flowchart divides into two phases. The early stages of the flowchart relate to the relevance of the data to the research objectives. The later stages of the flowchart are concerned with questions about the accuracy of secondary data.

**Figure 2.1 Evaluating secondary data**



From Joselyn (1977)<sup>2</sup>

## Sources of information

Secondary sources of information may be divided into two categories: internal sources and external sources.

### Internal sources of secondary information

**Sales data** All organisations collect information in the course of their everyday operations. Orders are received and delivered, costs are recorded, sales personnel submit visit reports, invoices are sent out, returned goods are recorded and so on. Much of this information is of potential use in marketing research but a surprising amount of it is actually used. Organisations frequently overlook this valuable resource by not beginning their search of secondary sources with an internal audit of sales invoices, orders, inquiries about products not stocked, returns from customers and sales force customer calling sheets. For example, consider how much information can be obtained from sales orders and invoices:

- Sales by territory
- Sales by customer type
- Prices and discounts
- Average size of order by customer, customer type, geographical area
- Average sales by sales person and
- Sales by pack size and pack type, etc.

This type of data is useful for identifying an organisation's most profitable product and customers. It can also serve to track trends within the enterprise's existing customer group.

**Financial data :** An organisation has a great deal of data within its files on the cost of producing, storing, transporting and marketing each of its products and product lines. Such data has many uses in marketing research including allowing measurement of the efficiency of marketing operations. It can also be used to estimate the costs attached to new products under consideration, of particular utilisation (in production, storage and transportation) at which an organisation's unit costs begin to fall.

**Transport data :** Companies that keep good records relating to their transport operations are well placed to establish which are the most profitable routes, and loads, as well as the most cost effective routing patterns. Good data on transport operations enables the enterprise to perform trade-off analysis and thereby establish whether it makes economic sense to own or hire vehicles, or the point at which a balance of the two gives the best financial outcome.

**Storage data :** The rate of stockturn, stockhandling costs, assessing the efficiency of certain marketing operations and the efficiency of the marketing system as a whole. More sophisticated accounting systems assign costs to the cubic space occupied by individual products and the time period over which the product occupies the space. These systems can be further refined so that the profitability per unit, and rate of sale, are added. In this way, the direct product profitability can be calculated.

## External sources of secondary information

The marketing researcher who seriously seeks after useful secondary data is more often surprised by its abundance than by its scarcity. Too often, the researcher has secretly (sometimes subconsciously) concluded from the outset that his/her topic of study is so unique or specialised that a research of secondary sources is futile. Consequently, only a specified search is made with no real expectation of sources. Cursory researches become a self-fulfilling prophecy. Dillon et.al<sup>3</sup>. give the following advice:

"You should never begin a half-hearted search with the assumption that what is being sought is so unique that no one else has ever bothered to collect it and publish it. On the contrary, assume there are scrolling secondary data that should help provide definition and scope for the primary research effort."

The same authors support their advice by citing the large numbers of organisations that provide marketing information including national and local government agencies, quasi-government agencies, trade associations, universities, research institutes, financial institutions, specialist suppliers of secondary marketing data and professional marketing research enterprises. Dillon et al further advise that searches of printed sources of secondary data begin with referral texts such as directories, indexes, handbooks and guides. These sorts of publications rarely provide the data in which the researcher is interested but serve in helping him/her locate potentially useful data sources.

The main sources of external secondary sources are (1) government (federal, state and local) (2) trade associations (3) commercial services (4) national and international institutions.

### Government statistics

These may include all or some of the following :

- Population censuses
- Social surveys, family expenditure surveys
- Import/export statistics
- Production statistics
- Agricultural statistics.

### Trade associations

Trade associations differ widely in the extent of their data collection and information dissemination activities. However, it is worth checking with them to determine what they do publish. At the very least one would normally expect that they would produce a trade directory and, perhaps, a yearbook.

### Commercial services

Published market research reports and other publications are available from a wide range of organisations which charge for their information. Typically, marketing people are interested in media statistics and consumer information which has been obtained from large scale consumer or farmer panels. The commercial organisation funds the collection of the data, which is wide ranging in its content, and hopes to make its money from selling this data to interested parties.

### National and international institutions

Bank economic reviews, university research reports, journals and articles are all useful sources to contact. International agencies such as World Bank, IMF, IFAD, UNDP, ITC, FAO and ILO produce a plethora of secondary data which can prove extremely useful to the marketing researcher.

## The information super-highway

Advances in computers and telecommunications technology have combined to allow people around the world to exchange information quickly and inexpensively. The computers of organisations, governments and even individuals can be linked to transmit and receive information through an international network of telephone lines, fibre optic cables and satellites. This international network is commonly known as the Internet.

## Chapter Summary

A search of secondary data sources should precede any primary research activity. Secondary data may be sufficient to solve the problem, or at least it helps the reader better understand the problem under study. Secondary data is cheaper and quicker to collect than primary data and can be more accurate.

Before making use of secondary data there is need to evaluate both the data itself and its source. Particular attention should be paid to definitions used, measurement error, source bias, reliability and the time span of the secondary data. Where possible, multiple data sources should be used so that one source can be cross-checked for consistency with another.

A great deal of potentially useful secondary information already exists within enterprises. Typically useful information would be that relating to sales, finance, production, storage and transportation.

Where a serious search of secondary sources is undertaken then the marketing researcher often finds an abundance of relevant material. Searches of printed secondary data should begin with a consultation of referral sources such as directories, handbooks, indexes, and the like.

It will almost certainly become the case, in all parts of the world, that electronic information sources will eventually supersede traditional printed sources. With the advent of Internet and CD-ROM, searches of secondary sources are becoming more efficient and more effective. Computer-based information systems give access to four different types of database bibliographic, numeric, directories and full-text.

## Key Terms

Full-text databases

Bibliographic databases

Direct product profitability

Directory databases

External sources

Internal sources

Internet

Measurement error

On-line databases

Numeric databases

Primary research

Secondary research

## Review Questions

From your knowledge of the material in this chapter, give brief answers to the following questions:

1. How do Dillon et al. advise researchers to begin their search for secondary data?
2. Name the four types of on-line database mentioned in the textbook.
3. Briefly list the main advantages of secondary data given in the textbook.
4. Why should the reliability of published statistics vary over time?
5. What sort of information would a full-text database contain?
6. Give the full meaning of the abbreviation CD-ROM.

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# Levels Of Measurement And Scaling

## Chapter 3

A common feature of marketing research is the attempt to have respondents communicate their feelings, attitudes, opinions, and evaluations in some measurable form. To this end, marketing researchers have developed a range of scales. Each of these has unique properties. What is important for the marketing analyst to realise is that they have widely differing measurement properties. Some scales are at very best, limited in their mathematical properties to the extent that they can only establish an association between variables. Other scales have more extensive mathematical properties and some, hold out the possibility of establishing cause and effect relationships between variables.

### Chapter Objectives

This chapter will give the reader:

- An understanding of the four levels of measurement that can be taken by researchers
- The ability to distinguish between comparative and non-comparative measurement scales, and
- A basic tool-kit of scales that can be used for the purposes of marketing research.

### Structure Of The Chapter

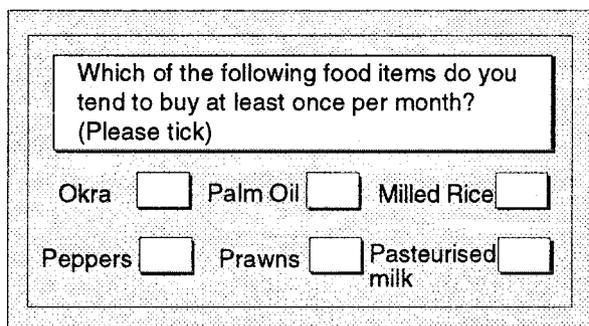
All measurements must take one of four forms and these are described in the opening section of the chapter. After the properties of the four categories of scale have been explained, various forms of comparative and non-comparative scales are illustrated. Some of these scales are numeric, others are semantic and yet others take a graphical form. The marketing researcher who is familiar with the complete tool kit of scaling measurements is better equipped to understand markets.

## Levels of measurement

Most texts on marketing research explain the four levels of measurement: nominal, ordinal, interval and ratio and so the treatment given to them here will be brief. However, it is an important topic since the type of scale used in taking measurements directly impinges on the statistical techniques which can legitimately be used in the analysis.

### Nominal scales

This, the crudest of measurement scales, classifies individuals, companies, products, brands or other entities into categories where no order is implied. Indeed it is often referred to as a categorical scale. It is a system of classification and does not place the entity along a continuum. It involves a simple count of the frequency of the cases assigned to the various categories, and if desired numbers can be nominally assigned to label each category as in the example below:



Which of the following food items do you tend to buy at least once per month?  
(Please tick)

Okra  Palm Oil  Milled Rice

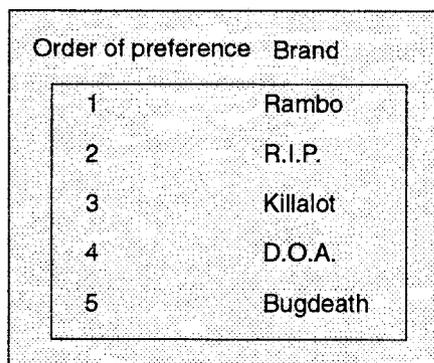
Peppers  Prawns  Pasteurised milk

Figure 3.1 An example of a nominal scale

The numbers have no arithmetic properties and act only as labels. The only measure of average which can be used is the mode because this is simply a set of frequency counts. Hypothesis tests can be carried out on data collected in the nominal form. The most likely would be the Chi-square test. However, it should be noted that the Chi-square is a test to determine whether two or more variables are associated and the strength of that relationship. It can tell nothing about the form of that relationship, where it exists, i.e. it is not capable of establishing cause and effect.

### Ordinal scales

Ordinal scales involve the ranking of individuals, attitudes or items along the continuum of the characteristic being scaled. For example, if a researcher asked farmers to rank 5 brands of pesticide in order of preference he/she might obtain responses like those in table 3.2 below.



Order of preference	Brand
1	Rambo
2	R.I.P.
3	Killalot
4	D.O.A.
5	Bugdeath

Figure 3.2 An example of an ordinal scale used to determine farmers' preferences among 5 brands of pesticide.

From such a table the researcher knows the order of preference but nothing about how much more one brand is preferred to another, that is there is no information about the interval between any two brands. All of the information a nominal scale would have given is available from an ordinal scale. In addition, positional statistics such as the median, quartile and percentile can be determined.

It is possible to test for order correlation with ranked data. The two main methods are Spearman's Ranked Correlation Coefficient and Kendall's Coefficient of Concordance. Using either procedure

one can, for example, ascertain the degree to which two or more survey respondents agree in their ranking of a set of items. Consider again the ranking of pesticides example in figure 3.2. The researcher might wish to measure similarities and differences in the rankings of pesticide brands according to whether the respondents' farm enterprises were classified as "arable" or "mixed" (a combination of crops and livestock). The resultant coefficient takes a value in the range 0 to 1. A zero would mean that there was no agreement between the two groups, and 1 would indicate total agreement. It is more likely that an answer somewhere between these two extremes would be found.

The only other permissible hypothesis testing procedures are the runs test and sign test. The runs test (also known as the Wald-Wolfowitz Test) is used to determine whether a sequence of binomial data - meaning it can take only one of two possible values e.g. African/non-African, yes/no, male/female - is random or contains systematic 'runs' of one or other value. Sign tests are employed when the objective is to determine whether there is a significant difference between matched pairs of data. The sign test tells the analyst if the number of positive differences in ranking is approximately equal to the number of negative rankings, in which case the distribution of rankings is random, i.e. apparent differences are not significant. The test takes into account only the direction of differences and ignores their magnitude and hence it is compatible with ordinal data.

## Interval scales

It is only with an interval scaled data that researchers can justify the use of the arithmetic mean as the measure of average. The interval or cardinal scale has equal units of measurement, thus making it possible to interpret not only the order of scale scores but also the distance between them. However, it must be recognised that the zero point on an interval scale is arbitrary and is not a true zero. This of course has implications for the type of data manipulation and analysis we can carry out on data collected in this form. It is possible to add or subtract a constant to all of the scale values without affecting the form of the scale but one cannot multiply or divide the values. It can be said that two respondents with scale positions 1 and 2 are as far apart as two respondents with scale positions 4 and 5, but not that a person with score 10 feels twice as strongly as one with score 5. Temperature is interval scaled, being measured either in Centigrade or Fahrenheit. We cannot speak of 50°F being twice as hot as 25°F since the corresponding temperatures on the centigrade scale, 10°C and -3.9°C, are not in the ratio 2:1.

Interval scales may be either numeric or semantic. Study the examples below in figure 3.3.

Please indicate your views on Balkan Olives by scoring them on a scale of 5 down to 1 (i.e. 5 = Excellent; 1 = Poor) on each of the criteria listed.

Balkan Olives are:					
Succulence	5	4	3	2	1
Fresh tasting	5	4	3	2	1
Free of skin blemish	5	4	3	2	1
Good value	5	4	3	2	1
Attractively packaged	5	4	3	2	1

(a)

---

Please indicate your views on Balkan Olives by ticking the appropriate responses below:

	Excellent	Very Good	Good	Fair	Poor
Succulent	_____	_____	_____	_____	_____
Freshness	_____	_____	_____	_____	_____
Freedom from skin blemish	_____	_____	_____	_____	_____
Value for money	_____	_____	_____	_____	_____
Attractiveness of packaging	_____	_____	_____	_____	_____

(b)

**Figure 3.3 Examples of interval scales in numeric and semantic formats**

Most of the common statistical methods of analysis require only interval scales in order that they might be used. These are not recounted here because they are so common and can be found in virtually all basic texts on statistics.

## Ratio scales

The highest level of measurement is a ratio scale. This has the properties of an interval scale together with a fixed origin or zero point. Examples of variables which are ratio scaled include weights, lengths and times. Ratio scales permit the researcher to compare both differences in scores and the relative magnitude of scores. For instance the difference between 5 and 10 minutes is the same as that between 10 and 15 minutes, and 10 minutes is twice as long as 5 minutes.

Given that sociological and management research seldom aspires beyond the interval level of measurement, it is not proposed that particular attention be given to this level of analysis. Suffice it to say that virtually all statistical operations can be performed on ratio scales.

## Measurement scales

The various types of scales used in marketing research fall into two broad categories: comparative and non comparative. In comparative scaling, the respondent is asked to compare one brand or product against another. With noncomparative scaling respondents need only evaluate a single product or brand. Their evaluation is independent of the other product and/or brands which the marketing researcher is studying.

Noncomparative scaling is frequently referred to as monadic scaling and this is the more widely used type of scale in commercial marketing research studies.

## Comparative scales

**Paired comparison<sup>2</sup>:** It is sometimes the case that marketing researchers wish to find out which are the most important factors in determining the demand for a product. Conversely they may wish to know which are the most important factors acting to prevent the widespread adoption of a product. Take, for example, the very poor farmer response to the first design of an animal-drawn mould board plough. A combination of exploratory research and shrewd observation suggested that the following factors played a role in the shaping of the attitudes of those farmers who feel negatively towards the design :

- Does not ridge
- Does not work for inter-cropping
- Far too expensive
- New technology too risky
- Too difficult to carry.

Suppose the organisation responsible wants to know which factors is foremost in the farmer's mind. It may well be the case that if those factors that are most important to the farmer than the others, being of a relatively minor nature, will cease to prevent widespread adoption. The alternatives are to abandon the product's re-development or to completely re-design it which is not only expensive and time-consuming, but may well be subject to a new set of objections.

The process of rank ordering the objections from most to least important is best approached through the questioning technique known as 'paired comparison'. Each of the objections is paired by the researcher so that with 5 factors, as in this example, there are 10 pairs-

i.e. 
$$\frac{n(n-1)}{2}, \frac{5(5-1)}{2} = 10 \text{ pairs}$$

In 'paired comparisons' every factor has to be paired with every other factor in turn. However, only one pair is ever put to the farmer at any one time.

The question might be put as follows :

Which of the following was the more important in making you decide not to buy the plough?

- The plough was too expensive
- It proved too difficult to transport

In most cases the question, and the alternatives, would be put to the farmer verbally. He/she then indicates which of the two was the more important and the researcher ticks the box on his questionnaire. The question is repeated with a second set of factors and the appropriate box ticked again. This process continues until all possible combinations are exhausted, in this case 10 pairs. It is good practice to mix the pairs of factors so that there is no systematic bias. The researcher should try to ensure that any particular factor is sometimes the first of the pair to be mentioned and sometimes the second. The researcher would never, for example, take the first factor (on this occasion 'Does not ridge') and systematically compare it to each of the others in succession. That is likely to cause systematic bias.

Below labels have been given to the factors so that the worked example will be easier to understand. The letters A - E have been allocated as follows:

- A = Does not ridge
- B = Far too expensive
- C = New technology too risky
- D = Does not work for inter-cropping
- E = Too difficult to carry.

The data is then arranged into a matrix. Assume that 200 farmers have been interviewed and their responses are arranged in the grid below. Further assume that the matrix is so arranged that we read from top to side. This means, for example, that 164 out of 200 farmers said the fact that the plough was too expensive was a greater deterrent than the fact that it was not capable of ridging. Similarly, 174 farmers said that the plough's inability to inter-crop was more important than the inability to ridge when deciding not to buy the plough.

	A	B	C	D	E
A	100	164	120	174	180
B	36	100	160	176	166
C	80	40	100	168	124
D	26	24	32	100	102
E	20	34	76	98	100

Figure 3.4 A preference matrix

If the grid is carefully read, it can be seen that the rank order of the factors is -

- Most important E - Too difficult to carry
- D - Does not inter crop
- C - New technology/high risk
- B - Too expensive
- Least important A - Does not ridge.

It can be seen that it is more important for designers to concentrate on improving transportability and, if possible, to give it an inter-cropping capability rather than focusing on its ridging capabilities (remember that the example is entirely hypothetical).

One major advantage to this type of questioning is that whilst it is possible to obtain a measure of the order of importance of five or more factors from the respondent, he is never asked to think about more than two factors at any one time. This is especially useful when dealing with illiterate farmers. Having said that, the researcher has to be careful not to present too many pairs of factors to the farmer during the interview. If he does, he will find that the farmer will quickly get tired and/or bored. It is as well to remember the formula of  $n(n - 1)/2$ . For ten factors, brands or product attributes this would give 45 pairs. Clearly the farmer should not be asked to subject himself to having the same question put to him 45 times. For practical purposes, six factors is possibly the limit, giving 15 pairs.

It should be clear from the procedures described in these notes that the paired comparison scale gives ordinal data.

**Dollar Metric Comparisons<sup>3</sup>:** This type of scale is an extension of the paired comparison method in that it requires respondents to indicate both their preference and how much they are willing to pay for their preference. This scaling technique gives the marketing researcher an interval - scaled measurement. An example is given in figure 3.5.

**Figure 3.5 An example of a dollar metric scale**

Which of the following types of fish do you prefer?		How much more, in cents, would you be prepared to pay for your preferred fish?	
Fresh	<input type="checkbox"/>	Fresh (guttled)	<input type="checkbox"/> \$0.70
Fresh (guttled)	<input type="checkbox"/>	Smoked	<input type="checkbox"/> 0.50
Frozen	<input type="checkbox"/>	Smoked	<input type="checkbox"/> 0.60
Frozen	<input type="checkbox"/>	Fresh	<input type="checkbox"/> 0.70
Smoked	<input type="checkbox"/>	Fresh	<input type="checkbox"/> 0.20
Frozen(guttled)	<input type="checkbox"/>	Frozen	<input type="checkbox"/>

From the data above the preferences shown below can be computed as follows:

Fresh fish	:	0.70	+	0.70	+	0.20	=	1.60
Smoked fish	:	0.60	+	(-0.20)	+	(-0.50)	=	(-1.10)
Fresh fish(guttled)	:	(-0.70)	+	0.30	+	0.50	=	0.10
Frozen fish	:	(-0.60)	+	(-0.70)	+	(-0.30)	=	(-1.60)

**The Unity-sum-gain technique:** A common problem with launching new products is one of reaching a decision as to what options, and how many options one offers. Whilst a company may be anxious to meet the needs of as many market segments as possible, it has to ensure that the segment is large enough to enable him to make a profit. It is always easier to add products to the product line but much more difficult to decide which models should be deleted. One technique for evaluating the options which are likely to prove successful is the unity-sum-gain approach.

The procedure is to begin with a list of features which might possibly be offered as 'options' on the product, and alongside each you list its retail cost. A third column is constructed and this forms an index of the relative prices of each of the items. The table below will help clarify the procedure. For the purposes of this example the basic reaper is priced at \$20,000 and some possible 'extras' are listed along with their prices.

The total value of these hypothetical 'extras' is \$7,460 but the researcher tells the farmer he has an equally hypothetical \$3,950 or similar sum. The important thing is that he should have considerably less hypothetical money to spend than the total value of the alternative product features. In this way the farmer is encouraged to reveal his preferences by allowing researchers to observe how he trades one additional benefit off against another. For example, would he prefer a side rake attachment on a 3 metre head rather than have a transporter trolley on either a standard or 2.5m wide head? The farmer

has to be told that any unspent money cannot be retained by him so he should seek the best value-for-money he can get.

In cases where the researcher believes that mentioning specific prices might introduce some form of bias into the results, then the index can be used instead. This is constructed by taking the price of each item over the total of \$ 7,460 and multiplying by 100. Survey respondents might then be given a maximum of 60 points and then, as before, are asked how they would spend these 60 points. In this crude example the index numbers are not too easy to work with for most respondents, so one would round them as has been done in the adjusted column. It is the relative and not the absolute value of the items which is important so the precision of the rounding need not overly concern us.

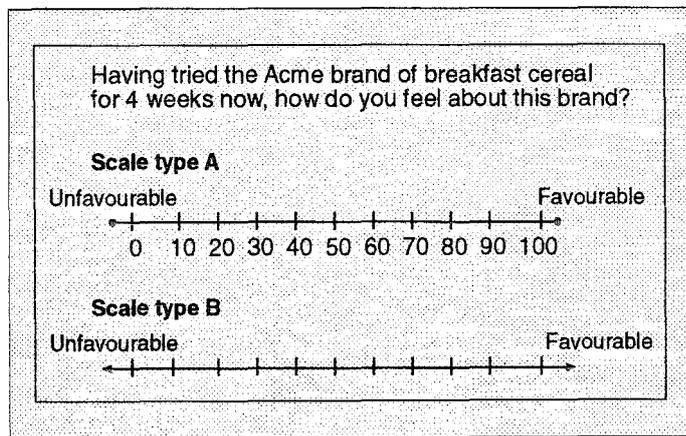
Item	Additional Cost (\$s)	Index	Adjusted Index
2.5 wide rather than standard 2m	2,000	27	30
Self lubricating chain rather than belt	200	47	50
Side rake attachment	350	5	10
Polymer heads rather than steel	250	3	5
Double rather than single edged cutters	210	2.5	5
Transporter trolley for reaper attachment	650	9	10
Automatic levelling of table	300	4	5

**Figure 3.6 The unity-sum-gain technique**

The unity-sum-gain technique is useful for determining which product features are more important to farmers. The design of the final market version of the product can then reflect the farmers' needs and preferences. Practitioners treat data gathered by this method as ordinal.

## Noncomparative scales

**Continuous rating scales:** The respondents are asked to give a rating by placing a mark at the appropriate position on a continuous line. The scale can be written on card and shown to the respondent during the interview. Two versions of a continuous rating scale are depicted in figure 3.7.



**Figure 3.7 Continuous rating scales**

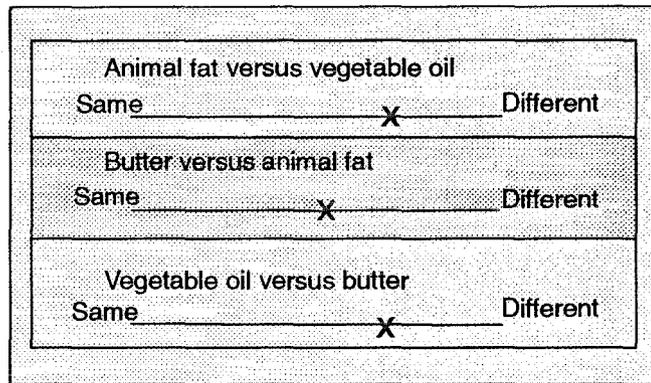
When version B is used, the respondent's score is determined either by dividing the line into as many categories as desired and assigning the respondent a score based on the category into which his/her mark falls, or by measuring the distance, in millimetres or inches, from either end of the scale.

Whichever of these forms of the continuous scale is used, the results are normally analysed as interval scaled.

**Line marking scale:** The line marked scale is typically used to measure perceived similarity differences between products, brands or other objects. Technically, such a scale is a form of what is termed a semantic differential scale since each end of the scale is labelled with a word/phrase (or semantic) that is opposite in meaning to the other. Figure 3.8 provides an illustrative example of such a scale.

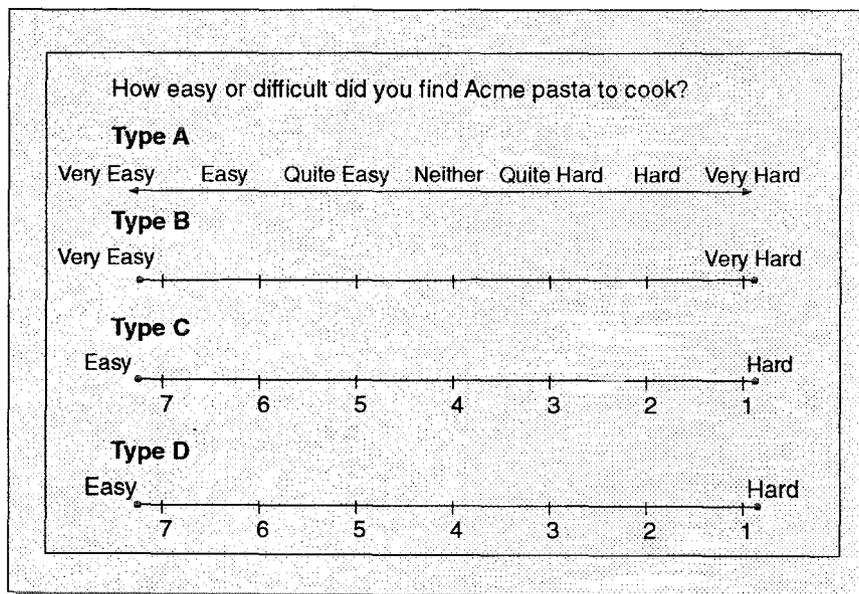
Consider the products below which can be used when frying food. In the case of each pair, indicate how similar or different they are in the flavour which they impart to the food.

**Figure 3.8 An example of a line marking scale**



For some types of respondent, the line scale is an easier format because they do not find discrete numbers (e.g. 5, 4, 3, 2, 1) best reflect their attitudes/feelings. The line marking scale is a continuous scale.

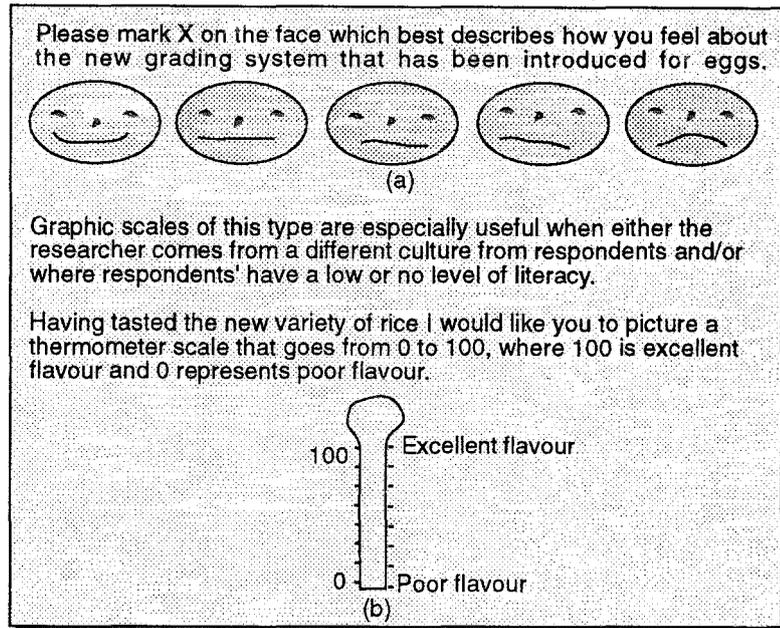
**Itemised rating scales:** With an itemised scale, respondents are provided with a scale having numbers and/or brief descriptions associated with each category and are asked to select one of the limited number of categories, ordered in terms of scale position, that best describes the product, brand, company or product attribute being studied. Examples of the itemised rating scale are illustrated in figure 3.9.



**Figure 3.9 Itemised rating scales**

Itemised rating scales can take a variety of innovative forms as demonstrated by the two illustrated in figure 3.9, which are graphic.

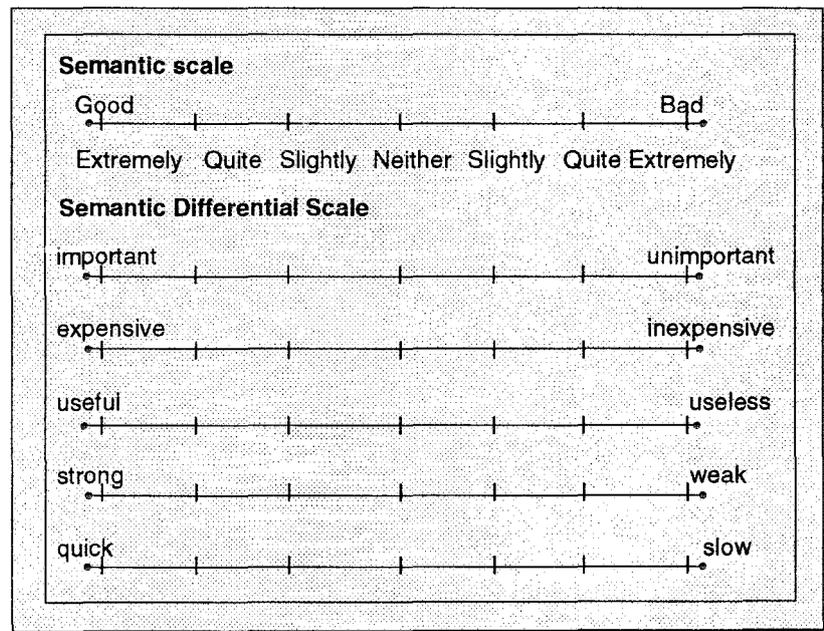
**Figure 3.10 Graphic itemised scales**



Whichever form of itemised scale is applied, researchers usually treat the data as interval level.

**Semantic scales:** This type of scale makes extensive use of words rather than numbers. Respondents describe their feelings about the products or brands on scales with semantic labels. When bipolar adjectives are used at the end points of the scales, these are termed semantic differential scales. The semantic scale and the semantic differential scale are illustrated in figure 3.11.

**Figure 3.11 Semantic and semantic differential scales**



**Likert scales:** A Likert scale is what is termed a summated instrument scale. This means that the items making up a Likert scale are summed to produce a total score. In fact, a Likert scale is a composite of itemised scales. Typically, each scale item will have 5 categories, with scale values ranging from -2 to +2 with 0 as neutral response. This explanation may be clearer from the example in figure 3.12.

Figure 3.12 The Likert scale

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
If the price of raw materials fell firms would reduce the price of their food products.	1	2	3	4	5
Without government regulation the firms would exploit the consumer.	1	2	3	4	5
Most food companies are so concerned about making profits they do not care about quality.	1	2	3	4	5
The food industry spends a great deal of money making sure that its manufacturing is hygienic.	1	2	3	4	5
Food companies should charge the same price for their products throughout the country	1	2	3	4	5

Likert scales are treated as yielding Interval data by the majority of marketing researchers.

The scales which have been described in this chapter are among the most commonly used in marketing research. Whilst there are a great many more forms which scales can take, if students are familiar with those described in this chapter they will be well equipped to deal with most types of survey problem.

## Chapter Summary

There are four levels of measurement: nominal, ordinal, interval and ratio. These constitute a hierarchy where the lowest scale of measurement, nominal, has far fewer mathematical properties than those further up this hierarchy of scales. Nominal scales yield data on categories; ordinal scales give sequences; interval scales begin to reveal the magnitude between points on the scale and ratio scales explain both order and the absolute distance between any two points on the scale.

The measurement scales, commonly used in marketing research, can be divided into two groups; comparative and non-comparative scales. Comparative scales involve the respondent in signaling where there is a difference between two or more producers, services, brands or other stimuli. Examples of such scales include; paired comparison, dollar metric, unity-sum-gain and line marking scales. Non-comparative scales, described in the textbook, are; continuous rating scales, itemised rating scales, semantic differential scales and Likert scales.

## Key Terms

Comparative scales

Interval measures

Itemised scales

Line scales

Monadic scales

Nominal measures

Ordinal measures

Paired comparison

Ratio measures

Semantic differential

Unity-sum-gain

## Review Questions

1. With which type of scale would Kendall's Concordance be used?
2. What is the more common name given to ordinal scales?
3. Why would a marketing researcher employ a dollar metric scale?
4. A researcher wants to measure consumer preference between 9 brands of vegetable oil and has decided to use the paired comparison method. How many pairs of brands will the researcher present to the respondents?
5. Explain what is meant by a semantic differential scale.
6. Two graphic scales are described in the textbook. What types of scale are these?
7. Look back to figure 3.5. What form of fish is most and least preferred?
8. What are the major statistical limitations to nominal scaled data?

## Chapter References

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# Questionnaire Design

## Chapter

## 4

No survey can achieve success without a well-designed questionnaire. Unfortunately, questionnaire design has no theoretical base to guide the marketing researcher in developing a flawless questionnaire. All the researcher has to guide him/her is a lengthy list of do's and don'ts born out of the experience of other researchers past and present. Hence, questionnaire design is more of an art than a science.

### Chapter Objectives

This chapter is intended to help the reader to:

- Understand the attributes of a well-designed questionnaire, and
- Adopt a framework for developing questionnaires.

### Structure Of The Chapter

A brief account of the key attributes of a sound questionnaire serves as the opening section of the chapter. This is followed by a nine-point framework for developing an effective questionnaire. These are the only two components of this chapter on questionnaire design.

## The qualities of a good questionnaire

The design of a questionnaire will depend on whether the researcher wishes to collect exploratory information (i.e. qualitative information for the purposes of better understanding or the generation of hypotheses on a subject) or quantitative information (to test specific hypotheses that have previously been generated).

**Exploratory questionnaires:** If the data to be collected is qualitative or is not to be statistically evaluated, it may be that no formal questionnaire is needed. For example, in interviewing the female head of the household to find out how decisions are made within the family when purchasing breakfast foodstuffs, a formal questionnaire may restrict the discussion and prevent a full exploration of the woman's views and processes. Instead one might prepare a brief guide, listing perhaps ten major open-ended questions, with appropriate probes/prompts listed under each.

**Formal standardised questionnaires:** If the researcher is looking to test and quantify hypotheses and the data is to be analysed statistically, a formal standardised questionnaire is designed. Such questionnaires are generally characterised by:

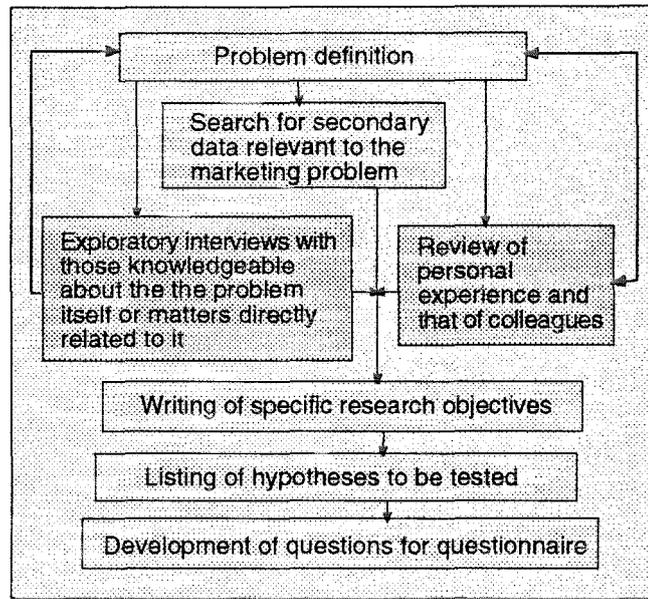
- prescribed wording and order of questions, to ensure that each respondent receives the same stimuli
- prescribed definitions or explanations for each question, to ensure interviewers handle questions consistently and can answer respondents' requests for clarification if they occur
- prescribed response format, to enable rapid completion of the questionnaire during the interviewing process.

Given the same task and the same hypotheses, six different people will probably come up with six different questionnaires that differ widely in their choice of questions, line of questioning, use of open-ended questions and length. There are no hard-and-fast rules about how to design a questionnaire, but there are a number of points that can be borne in mind :

- 1 A well-designed questionnaire should meet the research objectives. This may seem obvious, but many research surveys omit important aspects due to inadequate preparatory work, and do not adequately probe particular issues due to poor understanding. To a certain degree some of this is inevitable. Every survey is bound to leave some questions unanswered and provide a need for further research but the objective of good questionnaire design is to 'minimise' these problems.
- 2 It should obtain the most complete and accurate information possible. The questionnaire designer needs to ensure that respondents fully understand the questions and are not likely to refuse to answer, lie to the interviewer or try to conceal their attitudes. A good questionnaire is organised and worded to encourage respondents to provide accurate, unbiased and complete information.
- 3 A well-designed questionnaire should make it easy for respondents to give the necessary information and for the interviewer to record the answer, and it should be arranged so that sound analysis and interpretation are possible.
- 4 It would keep the interview brief and to the point and be so arranged that the respondent(s) remain interested throughout the interview.

Each of these points will be further discussed throughout the following sections. Figure 4.1 shows how questionnaire design fits into the overall process of research design that was described in chapter 1 of this textbook. It emphasises that writing of the questionnaire proper should not begin before an exploratory research phase has been completed.

**Figure 4.1 The steps preceding questionnaire design**



Even after the exploratory phase, two key steps remain to be completed before the task of designing the questionnaire should commence. The first of these is to articulate the questions that research is intended to address. The second step is to determine the hypotheses around which the questionnaire is to be designed.

It is possible for the piloting exercise to be used to make necessary adjustments to administrative aspects of the study. This would include, for example, an assessment of the length of time an interview actually takes, in comparison to the planned length of the interview; or, in the same way, the time needed to complete questionnaires. Moreover, checks can be made on the appropriateness of the timing of the study in relation to contemporary events such as avoiding farm visits during busy harvesting periods.

## Preliminary decisions in questionnaire design

There are nine steps involved in the development of a questionnaire:

- 1 Decide the information required.
- 2 Define the target respondents.
- 3 Choose the method(s) of reaching your target respondents.
- 4 Decide on question content.
- 5 Develop the question wording.
- 6 Put questions into a meaningful order and format.
- 7 Check the length of the questionnaire.
- 8 Pre-test the questionnaire.
- 9 Develop the final survey form.

## Deciding on the information required

It should be noted that one does not start by writing questions. The first step is to decide 'what are the things one needs to know from the respondent in order to meet the survey's objectives?' These, as has been indicated in the opening chapter of this textbook, should appear in the research brief and the research proposal.

One may already have an idea about the kind of information to be collected, but additional help can be obtained from secondary data, previous rapid rural appraisals and exploratory research. In respect of secondary data, the researcher should be aware of what work has been done on the same or similar problems in the past, what factors have not yet been examined, and how the present survey questionnaire can build on what has already been discovered. Further, a small number of preliminary informal interviews with target respondents will give a glimpse of reality that may help clarify ideas about what information is required.

## Define the target respondents

At the outset, the researcher must define the population about which he/she wishes to generalise from the sample data to be collected. For example, in marketing research, researchers often have to decide whether they should cover only existing users of the generic product type or whether to also include non-users. Secondly, researchers have to draw up a sampling frame. Thirdly, in designing the questionnaire we must take into account factors such as the age, education, etc. of the target respondents.

## Choose the method(s) of reaching target respondents

It may seem strange to be suggesting that the method of reaching the intended respondents should constitute part of the questionnaire design process. However, a moment's reflection is sufficient to conclude that the method of contact will influence not only the questions the researcher is able to ask but the phrasing of those questions. The main methods available in survey research are:

- personal interviews
- group or focus interviews
- mailed questionnaires
- telephone interviews.

Within this region the first two mentioned are used much more extensively than the second pair. However, each has its advantages and disadvantages. A general rule is that the more sensitive or personal the information, the more personal the form of data collection should be.

## Decide on question content

Researchers must always be prepared to ask, "Is this question really needed?" The temptation to include questions without critically evaluating their contribution towards the achievement of the research objectives, as they are specified in the research proposal, is surprisingly strong. No question should be included unless the data it gives rise to is directly of use in testing one or more of the hypotheses established during the research design.

There are only two occasions when seemingly "redundant" questions might be included:

- Opening questions that are easy to answer and which are not perceived as being "threatening", and/or are perceived as being interesting, can greatly assist in gaining the respondent's involvement in the survey and help to establish a rapport.

This, however, should not be an approach that should be overly used. It is almost always the case that questions which are of use in testing hypotheses can also serve the same functions.

- "Dummy" questions can disguise the purpose of the survey and/or the sponsorship of a study. For example, if a manufacturer wanted to find out whether its distributors were giving the consumers or end-users of its products a reasonable level of service, the researcher would want to disguise the fact that the distributors' service level was being investigated. If he/she did not, then rumours would abound that there was something wrong with the distributor.

## Develop the question wording

Survey questions can be classified into three forms, i.e. closed, open-ended and open response-option questions. So far only the first of these, i.e. closed questions has been discussed. This type of questioning has a number of important advantages;

- It provides the respondent with an easy method of indicating his answer - he does not have to think about how to articulate his answer.
- It 'prompts' the respondent so that the respondent has to rely less on memory in answering a question.
- Responses can be easily classified, making analysis very straightforward.
- It permits the respondent to specify the answer categories most suitable for their purposes.

### Disadvantages are also present when using such questions

- They do not allow the respondent the opportunity to give a different response to those suggested.
- They 'suggest' answers that respondents may not have considered before.

With open-ended questions the respondent is asked to give a reply to a question in his/her own words. No answers are suggested.

Example : "What do you like most about this implement?"

Open-ended questions have a number of advantages when utilised in a questionnaire:

- They allow the respondent to answer in his own words, with no influence by any specific alternatives suggested by the interviewer.
- They often reveal the issues which are most important to the respondent, and this may reveal findings which were not originally anticipated when the survey was initiated.
- Respondents can 'qualify' their answers or emphasise the strength of their opinions.

However, open-ended questions also have inherent problems which means they must be treated with considerable caution. For example :

- Respondents may find it difficult to 'articulate' their responses i.e. to properly and fully explain their attitudes or motivations.
- Respondents may not give a full answer simply because they may forget to mention important points. Some respondents need prompting or reminding of the types of answer they could give.
- Data collected is in the form of verbatim comments - it has to be coded and reduced to manageable categories. This can be time consuming for analysis and there are numerous opportunities for error in recording and interpreting the answers given on the part of interviewers.
- Respondents will tend to answer open questions in different 'dimensions'. For example, the question: "When did you purchase your tractor?", could elicit one of several responses, viz:

"A short while ago".

"Last year".

"When I sold my last tractor".

"When I bought the farm".

Such responses need to be probed further unless the researcher is to be confronted with responses that cannot be aggregated or compared.

It has been suggested that the open response-option questions largely eliminate the disadvantages of both the afore-mentioned types of question. An open response-option is a form of question which is both open-ended and includes specific response-options as well. For example,

What features of this implement do you like?

- Performance
- Quality
- Price
- Weight
- Others mentioned:

The advantages of this type of question are twofold:

- The researcher can avoid the potential problems of poor memory or poor articulation by then subsequently being able to prompt the respondent into considering particular response options.
- Recording during interview is relatively straightforward.

The one disadvantage of this form of question is that it requires the researcher to have a good prior knowledge of the subject in order to generate realistic/likely response options before printing the questionnaire. However, if this understanding is achieved the data collection and analysis process can be significantly eased.

Clearly there are going to be situations in which a questionnaire will need to incorporate all three forms of question, because some forms are more appropriate for seeking particular forms of response. In instances where it is felt the respondent needs assistance to articulate answers or provide answers on a preferred dimension determined by the researcher, then closed questions should be used. Open-ended questions should be used where there are likely to be a very large number of possible different responses (e.g. farm size), where one is seeking a response described in the respondent's own words, and when one is unsure about the possible answer options. The mixed type of question would be advantageous in most instances where most potential response-options are known; where unprompted and prompted responses are valuable, and where the survey needs to allow for unanticipated responses.

There are a series of questions that should be posed as the researchers develop the survey questions themselves:

"Is this question sufficient to generate the required information?"

For example, asking the question "Which product do you prefer?" in a taste panel exercise will reveal nothing about the attribute(s) the product was judged upon. Nor will this question reveal the degree of preference. In such cases a series of questions would be more appropriate.

"Can the respondent answer the question correctly?"

- An inability to answer a question arises from three sources:
- Having never been exposed to the answer, e.g. "How much does your husband earn?"
- Forgetting, e.g. "What price did you pay when you last bought maize meal?"
- An inability to articulate the answer. e.g. "What improvements would you want to see in food preparation equipment?"

"Are there any external events that might bias response to the question?"

For example, judging the popularity of beef products shortly after a foot and mouth epidemic is likely to have an effect on the responses.

"Do the words have the same meaning to all respondents?"

For example, "How many members are there in your family?"

There is room for ambiguity in such a question since it is open to interpretation as to whether one is speaking of the immediate or extended family.

"Are any of the words or phrases loaded or leading in any way?"

For example, "What did you dislike about the product you have just tried?"

The respondent is not given the opportunity to indicate that there was nothing he/she disliked about the product. A less biased approach would have been to ask a preliminary question along the lines of, "Did you dislike any aspect of the product you have just tried?", and allow him/her to answer yes or no.

"Are there any implied alternatives within the question?"

The presence or absence of an explicitly stated alternative can have dramatic effects on responses. For example, consider the following two forms of a question asked of a 'Pasta-in-a-Jar' concept test:

1. "Would you buy pasta-in-a-jar if it were locally available?"
2. "If pasta-in-a-jar and the cellophane pack you currently use were both available locally, would you:
  - Buy only the cellophane packed pasta?
  - Buy only the pasta-in-a-jar product?
  - Buy both products?"

The explicit alternatives provide a context for interpreting the true reactions to the new product idea. If the first version of the question is used, the researcher is almost certain to obtain a larger number of positive responses than if the second form is applied.

"Will the question be understood by the type of individual to be interviewed?"

It is good practice to keep questions as simple as possible. Researchers must be sensitive to the fact that some of the people he/she will be interviewing do not have a high level of education. Sometimes he/she will have no idea how well or badly educated the respondents are until he/she gets into the field. In the same way, researchers should strive to avoid long questions. The fewer words in a question the better. Respondents' memories are limited and absorbing the meaning of long sentences can be difficult. In listening to something they may not have much interest in, the respondents' minds are likely to wander, they may hear certain words but not others, or they may remember some parts of what is said but not all.

"Is there any ambiguity in my questions?"

The careless design of questions can result in the inclusion of two items in one question. For example: "Do you like the speed and reliability of your tractor?"

The respondent is given the opportunity to answer only 'yes' or 'no', whereas he might like the speed, but not the reliability, or vice versa. Thus it is difficult for the respondent to answer and equally difficult for the researcher to interpret the response.

The use of ambiguous words should also be avoided. For example: "Do you regularly service your tractor?"

The respondents' understanding and interpretation of the term 'regularly' will differ. Some may consider that regularly means once a week, others may think once a year is regular. The inclusion of such words again present interpretation difficulties for the researcher.

"Are any words or phrases vague?"

Questions such as 'What is your income?' are vague and one is likely to get many different responses with different dimensions. Respondents may interpret the question in different terms, for example:

- hourly pay?
- weekly pay?
- yearly pay?
- income before tax?
- income after tax?
- income in kind as well as cash?
- income for self or family?
- all income or just farm income?

The researcher needs to specify the 'term' within which the respondent is to answer.

"Are any questions too personal or of a potentially embarrassing nature?"

The researcher must be clearly aware of the various customs, morals and traditions in the community being studied. In many communities there can be a great reluctance to discuss certain questions with interviewers/strangers. Although the degree to which certain topics are taboo varies from area to area, such subjects as level of education, income and religious issues may be embarrassing and respondents may refuse to answer.

"Do questions rely on feats of memory?"

The respondent should be asked only for such data as he is likely to be able to clearly remember. One has to bear in mind that not everyone has a good memory, so questions such as 'Four years ago was there a shortage of labour?' should be avoided.

## Putting questions into a meaningful order and format

**Opening questions:** Opening questions should be easy to answer and not in any way threatening to the respondents. The first question is crucial because it is the respondent's first exposure to the interview and sets the tone for the nature of the task to be performed. If they find the first question difficult to understand, or beyond their knowledge and experience, or embarrassing in some way, they are likely to break off immediately. If, on the other hand, they find the opening question easy and pleasant to answer, they are encouraged to continue.

**Question flow:** Questions should flow in some kind of psychological order, so that one leads easily and naturally to the next. Questions on one subject, or one particular aspect of a subject, should be grouped together. Respondents may feel it disconcerting to keep shifting from one topic to another, or to be asked to return to some subject they thought they gave their opinions about earlier.

**Question variety:** Respondents become bored quickly and restless when asked similar questions for half an hour or so. It usually improves response, therefore, to vary the respondent's task from time to time. An open-ended question here and there (even if it is not analysed) may provide much-needed relief from a long series of questions in which respondents have been forced to limit their replies to pre-coded categories. Questions involving showing cards/pictures to respondents can help vary the pace and increase interest.

**Closing questions:** It is natural for a respondent to become increasingly indifferent to the questionnaire as it nears the end. Because of impatience or fatigue, he may give careless answers to the later questions. Those questions, therefore, that are of special importance should, if possible, be included in the earlier part of the questionnaire. Potentially sensitive questions should be left to the end, to avoid respondents cutting off the interview before important information is collected.

In developing the questionnaire the researcher should pay particular attention to the presentation and

layout of the interview form itself. The interviewer's task needs to be made as straight-forward as possible.

- Questions should be clearly worded and response options clearly identified.
- Prescribed definitions and explanations should be provided. This ensures that the questions are handled consistently by all interviewers and that during the interview process the interviewer can answer/clarify respondents' queries.

Ample writing space should be allowed to record open-ended answers, and to cater for differences in handwriting between interviewers.

## Physical appearance of the questionnaire

The physical appearance of a questionnaire can have a significant effect upon both the quantity and quality of marketing data obtained. The quantity of data is a function of the response rate. Ill-designed questionnaires can give an impression of complexity, medium and too big a time commitment. Data quality can also be affected by the physical appearance of the questionnaire with unnecessarily confusing layouts making it more difficult for interviewers, or respondents in the case of self-completion questionnaires, to complete this task accurately. Attention to just a few basic details can have a disproportionately advantageous impact on the data obtained through a questionnaire.

### Use of booklets

The use of booklets, in the place of loose or stapled sheets of paper, make it easier for interviewer or respondent to progress through the document. Moreover, fewer pages tend to get lost.

### Simple, clear formats

The clarity of questionnaire presentation can also help to improve the ease with which interviewers or respondents are able to complete a questionnaire.

### Creative use of space and typeface

In their anxiety to reduce the number of pages of a questionnaire there is a tendency to put too much information on a page. This is counter-productive since it gives the questionnaire the appearance of being complicated. Questionnaires that make use of blank space appear easier to use, enjoy higher response rates and contain fewer errors when completed.

### Use of colour coding

Colour coding can help in the administration of questionnaires. It is often the case that several types of respondents are included within a single survey (e.g. wholesalers and retailers). Printing the questionnaires on two different colours of paper can make the handling easier.

### Interviewer instructions

Interviewer instructions should be placed alongside the questions to which they pertain. Instructions on where the interviewers should probe for more information or how replies should be recorded are placed after the question.

In general it is best for a questionnaire to be as short as possible. A long questionnaire leads to a long interview and this is open to the dangers of boredom on the part of the respondent (and poorly considered, hurried answers), interruptions by third parties and greater costs in terms of interviewing time and resources. In a rural situation an interview should not last longer than 30-45 minutes.

## Piloting the questionnaires

Even after the researcher has proceeded along the lines suggested, the draft questionnaire is a product evolved by one or two minds only. Until it has actually been used in interviews and with respondents, it is impossible to say whether it is going to achieve the desired results. For this reason it is necessary to pre-test the questionnaire before it is used in a full-scale survey, to identify any mistakes that need correcting.

The purpose of pretesting the questionnaire is to determine :

- whether the questions as they are worded will achieve the desired results
- whether the questions have been placed in the best order
- whether the questions are understood by all classes of respondent
- whether additional or specifying questions are needed or whether some questions should be eliminated
- whether the instructions to interviewers are adequate.

Usually a small number of respondents are selected for the pre-test. The respondents selected for the pilot survey should be broadly representative of the type of respondent to be interviewed in the main survey.

If the questionnaire has been subjected to a thorough pilot test, the final form of the questions and questionnaire will have evolved into its final form. All that remains to be done is the mechanical process of laying out and setting up the questionnaire in its final form. This will involve grouping and sequencing questions into an appropriate order, numbering questions, and inserting interviewer instructions.

## Chapter Summary

A well designed questionnaire is essential to a successful survey. However, the researcher must develop his/her own intuition with respect to what constitutes 'good design' since there is no theory of questionnaires to guide him/her.

A good questionnaire is one which help directly achieve the research objectives, provides complete and accurate information; is easy for both interviewers and respondents to complete, is so designed as to make sound analysis and interpretation possible and is brief.

There are at least nine distinct steps: decide on the information required; define the target respondents, select the method(s) of reaching the respondents; determine question content; word the questions; sequence the questions; check questionnaire length; pre-test the questionnaire and develop the final questionnaire.

## Key Terms

Group focus interviews  
Mailed questionnaire  
Open-ended and open  
response-option questions

Personal interviews  
Piloting questionnaires

Target respondents  
Telephone interviews

## Review Questions

1. Summarise the qualities of a good questionnaire.
2. Where should interviewer instructions pertaining to responses to a particular question be placed on the questionnaire?
3. The textbook says that one does not start by writing questions. How should the researcher begin?
5. Name the three advantages of open-ended questions.
6. What are the three reasons why a respondent is unable to answer a question?
7. What is the recommended duration of interviews carried out in rural situations?

4. What are the two occasions when apparently "redundant" questions should be found in a questionnaire?

8. What are the key characteristics of opening questions in a questionnaire?

## Chapter References

1. Crawford, I. M. (1990) *Marketing Research* Centre for Agricultural Marketing Training in Eastern and Southern Africa. Harare Zimbabwe.
2. Sudman, S. and Bradburn, N. M. (1973), *Asking Questions*, pp.208 - 28.

# Personal Interviews

## Chapter

## 5

Marketing research data is essentially of two types, that have already been defined: secondary and primary. With respect to primary research, the foremost tool is the personal interview. The face-to-face contact between researcher and respondent is not equal in terms of the potential quality of data that can be obtained. In the face-to-face interview it is possible to record more than the verbal responses of the interviewee, which are often superficial. When human beings communicate directly with each other much more information is communicated between them. When two people face one another, the dialogue is conducted on several levels. It goes beyond verbal expression. The nature of words used, facial expressions and body language all communicate what the other party means. This chapter explains the role of personal interviews in marketing research.

### Chapter Objectives

Having read this chapter of the textbook the reader will:

- Become aware of the different forms which personal interviews can take
- Learn how to structure both individual and group interviews
- Recognise the main difficulties encountered when conducting interviews, and
- Understand the role of the moderator in focus group sessions.

### Structure Of The Chapter

The chapter begins by drawing a distinction between structured and unstructured interviews before proceeding to advise on how interviews can best be conducted. Sources of bias arising in personal interviews are then discussed. This is followed by a detailed account of focus groups covering the role in marketing research, structuring of group sessions, screening of participants and the role of the moderator.

## Types of personal interview

The two main types of interviews conducted in marketing research are structured and unstructured.

### Unstructured informal interview

The unstructured informal interview is normally conducted as a preliminary step in the research process to generate ideas/hypotheses about the subject being investigated so that these might be tested later in the survey proper. Such interviews are entirely informal and are not controlled by a specific set of detailed questions. Rather the interviewer is guided by a pre-defined list of issues. These interviews amount to an informal conversation about the subject.

Informal interviewing is not concerned with discovering 'how many' respondents think in a particular way on an issue (this is what the final survey itself will discover). The aim is to find out how people think and how they react to issues, so that the ultimate survey questionnaire can be framed along the lines of thought that will be most natural to respondents.

The respondent is encouraged to talk freely about the subject, but is kept to the point on issues of interest to the researcher. The respondent is encouraged to reveal everything that he/she feels and thinks about these points. The interviewer must note (or tape-record) all remarks that may be relevant and pursue them until he/she is satisfied that there is no more to be gained by further probing. Properly conducted, informal interviews can give the researcher an accurate feel for the subject to be surveyed. Focus groups, discussed later in this chapter, make use of relatively unstructured interviews.

### Structured standardised interview

With structured standardised interviews, the format is entirely different. A structured interview follows a specific questionnaire and this research instrument is usually used as the basis for most quantitative surveys. A standardised structured questionnaire is administered where specific questions are asked in a set order and in a set manner to ensure no variation between interviews.

Respondents' answers are recorded on a questionnaire form (usually with pre-specified response formats) during the interview process, and the completed questionnaires are most often analysed quantitatively. The structured interview usually denies the interviewer the opportunity to either add or remove questions, change their sequence or alter the wording of questions.

## Depth interviews

Depth interviews are one-to-one encounters in which the interviewer makes use of an unstructured or semi-structured set of issues/topics to guide the discussion. The object of the exercises is to explore and uncover deep-seated emotions, motivations and attitudes. They are most often employed when dealing with sensitive matters and respondents are likely to give evasive or even misleading answers when directly questioned. Most of the techniques used in the conduct of depth interviews have been borrowed from the field of psychoanalysis. Depth interview are usually only successful when conducted by a well trained and highly skilled interviewer.

Other instances when depth interviews can be particularly effective are: where the study involves an investigation of complex behaviour or decision-making processes; when the target respondents are difficult to gather together for group interviews (e.g. farmers, veterinary surgeons, haulage contractors, government officials); and where the interviewee is prepared to become an informant only if he/she is able to preserve his/her anonymity.

Dillon et al<sup>1</sup>. believe that to be effective, the interviewer must adhere to six fundamental rules. These are:

- he/she must avoid appearing superior or condescending and make use of only familiar words
- he/she must put question indirectly and informatively

- he/she must remain detached and objective
- he/she must avoid questions and questions structure that encourage 'yes' or 'no' answers
- he/she must probe until all relevant details, emotions and attitudes are revealed
- he/she must provide an atmosphere that encourages the respondent to speak freely, yet keeping the conversation focused on the issue(s) being researched

Depth interviews involve a heavy time commitment, especially on the part of the marketing researcher. Interview transcripts have to be painstakingly recovered, if they are to be accurate, either from terse interview notes or from tape-recordings of the interviews. This can take many hours of often laborious work. The transcripts then have to be read and re-read, possibly several times, before the researcher is able to begin the taxing process of analysing and interpreting the data.

## Telephone Interviews

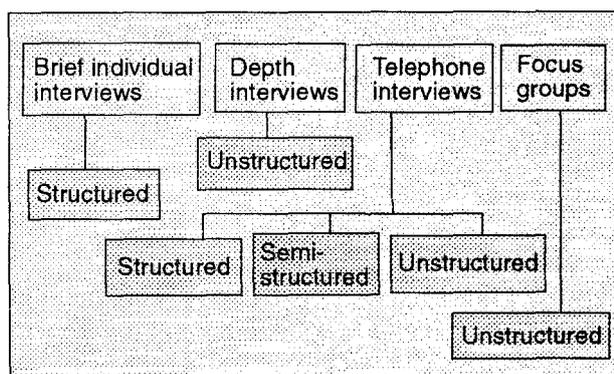
Whilst telephone interviews among consumers, are very common in the developed world, these are conducted with far less frequency in the developing world. The reason is somewhat obvious, i.e. only a relatively small proportion of the total population has a telephone in the house. Moreover, telephone owners tend to be urban dwellers and have above average incomes and are therefore unrepresentative of the population as a whole.

To a greater extent, telephone interviewing has potential in surveys of businesses, government agencies and other organisations or institutions. Even then, it is still the case that telephone surveys are rarely without bias. Whilst it is true that many businesses have a telephone, small businesses and even medium-sized enterprises are far less likely to have access to telephones.

Telephone interviews afford a certain amount of flexibility. It is possible, for example, for interviewers to put complex questions over the telephone. The interviewers can probe, skip questions that prove irrelevant to the case of a particular respondent and change the sequence of questions in response to the flow of the discussion, and earlier replies can be revisited. The interaction between interviewer and interviewee that is possible over the telephone simply is not achievable through a mailed questionnaire. In comparison to personal interviews, telephone interviews do not appear to enjoy any margin of advantage. Perhaps the only advantages are those of speed and cost. Even then, manpower costs in developing countries tend to be very low and so only speed remains as a potential advantage over personal interviews.

In the developed world, the era of computer-assisted telephone interviewing (CATI) has begun. Researchers conduct the telephone interview whilst seated at a computer. Responses are entered directly into the computer, by the interviewer. The screen displays the questionnaire and any skipping of questions, due to earlier responses directing that some questions are not applicable in the case of the interviewee, is controlled automatically by the computer. Since the responses are entered directly into the computer the data is instantaneously processed. The computer can also be programmed to produce standardised marketing reports.

Figure 5.1 Types of personal interview



## Conducting the interviews

It is essential, for both types of interview format, that the interviewer has a good grasp of the study's objectives, and of the information that is to be collected. This will enable 'probing' to elicit the right data required, and ensure all relevant issues are covered. Furthermore, some respondents may ask why a particular question was included in an interview, and it may be necessary for the interviewer to be able to 'justify' particular questions.

In rural areas it is customary before embarking on a formal interviewing survey to notify the relevant public authorities, e.g. village head, district union, etc. to ensure co-operation from respondents. Sometimes individuals may refuse to co-operate unless they are convinced that the interviewer has permission and approval to conduct the survey from the recognised local authorities.

Before commencing on interviews it is as well for the interviewer to prepare what he/she is going to say when he/she first meets a respondent. Decisions need to be made as to whether the respondent is to be told who is sponsoring the study, the purpose of the study, or how the data is to be used, and so on. These points need to be decided beforehand to ensure that a 'standardised' approach is used for each interview. Variations in approach style may lead to different types of response from respondents and therefore variations in results. If suitable introductions are prepared in advance, no time will be lost during the interview in lengthy explanations, and a good impression can be created from the start.

**Interview approach in the field:** It is important that the interviewer keeps as low a profile as possible in the rural setting. Interviewers should walk as much as possible and in small numbers - two in a team is often best. If the research team is large, it is advisable to divide the study area into a number of zones to avoid duplicating efforts or interviewing the same respondents.

Once an individual who appears to be worth interviewing is spotted in the field, it is best not to wander around indecisively creating suspicion. He/she should be approached directly. However, one should avoid startling potential respondents by running up to them and pulling out the questionnaire for interview. Blending into the local context as much as possible is obviously the best strategy. One should always be sensitive to the fact that most people may be suspicious of outsiders.

The timing of the interview can be very important. One should be aware of the daily schedule, seasonal activities, and work habits of potential respondents. For example, if a farmer is irrigating and receives water only once a week for an hour, he/she may not be interested in participating in an interview at that time.

**Interview introduction:** The introduction to an interview is crucial. A good introduction can effectively gain the respondent's co-operation and a good interview, but a bad introduction could result in refusal to co-operate or biased responses.

**Greeting:** This should be made according to local custom.

**Small talk:** Being approached by a stranger will make the potential respondent feel uncomfortable. It is necessary to help him/her feel at ease by starting with polite small talk about the weather or crop conditions, (in the case of a farmer ) or about the health of the family and the general economic climate in the case of non-farmers.

**Overcoming apprehension:** The approach of an interviewer is still an unfamiliar experience to most people. Many people are suspicious of outsiders and particularly interviewers. Some may think the interviewer is an 'official' who has come to check up on them for taxes. Certainly many potential respondents will fear that the information they give will be used against them at a later date, or that the interviewer is trying to probe family secrets. To ensure co-operation it is important to :

- Keep the atmosphere relaxed and informal.

It can be helpful if the interviewer plays down the fact that he/she wishes to conduct a 'formal' interview. Respondents can be encouraged to think that the interviewer is interested in conversation rather than interrogation.

- Explain why the interview is necessary.

The respondent should be given a brief background as to the nature and purpose of the study. This will bring him/her into the interviewer's confidence.

- Stress the value/benefit of the study to the respondent

Respondents are more likely to co-operate if they think they will ultimately benefit from the study. If one can indicate that as a result of the study it will be possible to develop better and cheaper products for the respondent, then they should be encouraged to co-operate.

- Appeal to the instincts of pride and vanity of the respondent

The respondent needs to be made to feel important. He/she needs to be made to feel that the interviewer is particularly interested in his/her opinion because he/she is the 'expert' and 'informed'.

Additional points that may help to put the respondent at ease could include:

**Language:** It is advisable that marketing researchers should adopt the language of those from whom they hope to obtain information.

"... using local names for socio-economic characteristics, bio-physical characteristics, lands, customs, time, intervals and measures".

**Length of interview:** The respondent can be assured that the interview will be brief. It is unwise to be deceitful here, otherwise there is a danger that the interview may be stopped mid-way by an angry respondent.

**Confidentiality:** The respondent can be assured that the interviewer will not reveal the respondent's identity (and will use the data only in aggregate form) or give the results to official organisations.

**Closing interview:** After all relevant topics have been covered or the respondent's time exhausted, the conversation should be brought to an end. If the weather is unfavourable (too hot or too wet) or the respondent seems pressed for time it is best to prematurely stop the interview. The departure is best done gracefully, naturally and not too abruptly. The business-like 'Got to go' departure should be avoided. The respondent should be thanked for his/her time and given the appropriate customary farewell.

## Interview recording

All the best interviewing is useless if it has not been adequately recorded, so it is important to ensure good recording conditions. In an open-ended interview it is difficult to make notes on everything during the interview. The best approach in team-work is to appoint a scribe, i.e. a person whose job it is to write everything down. How long one waits before writing up full field-notes depends on the setting, and the interviewer's personal style but it should be borne in mind that an interviewer's memory is limited. It is surprising how facts, ideas and important observations that one thinks one will never forget quickly slip away. Half of the details from an interview can be forgotten within 24 hours, three-quarters can be lost within 2 days and after this only skeletal notes can be salvaged. Jotted notes will help prompt memory later, but it is best to write up interview notes while they are still fresh in the interviewer's mind after the interview or at the end of the interviewing day.

**Use of tape-recorders:** A tape recorder can often be useful. It enables the interviewer to give the respondent his/her full attention during the interview and avoid the need to be constantly scribbling notes. It can also enable data to be left until such time as analysis can be applied more rigorously and in a more leisurely way. It should be borne in mind, however, that not everyone likes to be tape-recorded. If taping is contemplated the respondents' permission should be sought first.

## Sources of error and bias

In personal interviews there are many ways in which 'errors' can be made by both the respondent and the interviewer, and this can lead to 'bias' in the results. The objective of the interviewer should be to minimise the likelihood of such bias arising.

## Respondent induced bias

**Faulty memory:** Some respondents may answer a question incorrectly simply because they have a poor memory. The key to avoiding this problem is to steer clear of questions requiring feats of memory. For example, questions such as, "Can you tell me what your crop yield was four years ago?" should be avoided. Other aspects of faulty memory that were mentioned in the previous chapter were telescoping and creation.

**Exaggeration and dishonesty:** There can be a tendency on the part of some respondents to exaggerate claims about their conditions and problems if they think it will further their cause and lead to improvement in their well-being. The interviewer must be alert to, and note any, inconsistencies arising. This is best achieved by checking key pieces of information with a variety of sources.

**Failure to answer questions correctly:** If rapport is not developed sufficiently, the respondent may be unwilling to respond or fail to give sufficient attention or consideration to the questions asked, and if the respondent does not understand a question properly he may give inappropriate answers. The interviewer needs to ensure that the respondent fully understands the questions being asked and is responding in the appropriate context.

**Misunderstanding purpose of interview:** Some respondents may perceive the purpose of the survey to be a long-winded form of 'selling', particularly if the interviewer is asking them what they think about a new product. Their comments, therefore, about such issues as 'propensity to purchase' need to be looked at within a context where they may be expecting to have to buy the product at some stage and are trying to strike a hard bargain. To avoid such problems arising it is important to carefully explain the objectives of the survey, the identity of the interviewer and sponsor, and what is required of the respondent, prior to the interview proper.

**Influence of groups at interview:** During interviews the presence of other individuals is almost inevitable. Most of the time other family members or neighbours will wish to join in the discussion. Such a situation can have important implications for the type of data obtained. The respondent may be tempted to answer in a way that gives him/her credibility in the eyes of onlookers, rather than giving a truthful reply. In circumstances where the presence of third parties cannot be avoided, the interviewer must ensure as far as possible that the answers being given are the honest opinions of the individual being interviewed. The interviewer must again be alert to inconsistencies and closely observe and monitor the way in which the respondent is reacting and interacting with those around him.

**Courtesy bias:** In interview situations it is quite possible that one will come across the problem of courtesy bias, i.e. the tendency for respondents to give answers that they think the interviewer wants to hear, rather than what they really feel. The respondents may not wish to be impolite or to offend the interviewer, and may therefore endeavour to give 'polite' answers. Courtesy bias can be an obstacle to obtaining useful and reliable data and therefore needs to be minimised. Generally, however, the creation of a good interview environment and an appropriate relationship between the interviewer and the respondent can help avoid too much courtesy bias arising:

## Bias induced by interviewer

It is also possible for the interviewer him or herself to introduce bias into an interview, and this must be avoided at all costs.

**Desire to help the respondent:** The interviewer may become too sympathetic to the problems and conditions of the respondent, and this can affect the conduct of, and results obtained from, the interview. Objectivity must be retained at all times.

**Failure to follow instructions in administering the questions:** It is often tempting for the interviewer to change the wording of a question or introduce inflections in questions. This can affect the respondent's understanding and can bias his/her replies. Particular problems may arise if the respondent does not understand the question as stated and the interviewer tries to simplify the question. The altered wording may constitute a different

question. When questions are open-ended, this can involve the interviewer in formulating probing questions that go beyond the printed words. Unless the probes follow instructions faithfully the potential for bias is great.

**Reactions to responses:** When respondents give answers, the interviewer must be careful not to 'react.' A note of 'surprise' or 'disbelief' may easily bias the respondent's subsequent answers. Interviewers must respond with a uniform polite interest only.

## Focus group interviews

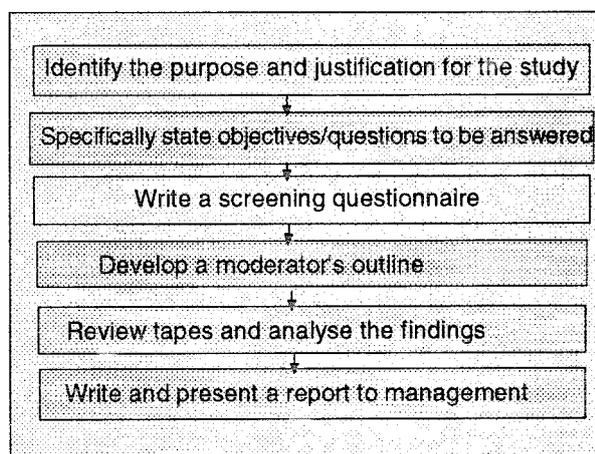
Focus group interviews are a survey research instrument which can be used in addition to, or instead of, a personal interview approach. It has particular advantages for use in qualitative research applications. The central feature of this method of obtaining information from groups of people is that the interviewer strives to keep the discussion led by a moderator focused upon the issue of concern. The moderator behaves almost like a psycho-therapist who directs the group towards the focus of the researcher. In doing so, the moderator speaks very little, and encourages the group to generate the information required by stimulating discussion through terse provocative statements.

### Characteristics of focus group interviews

The groups of individuals (e.g. housewives, farmers, manufacturers, etc.) are invited to attend an informal discussion. Usually between 6 and 8 participants are involved and the discussion would last between 1 and 2 hours. Small groups tend to lose the mutual stimulation among participants, whilst large groups can be difficult to manage and may prevent some participants having the opportunity to get fully involved in the discussion.

The researcher raises issues for discussion, following a 'guide list of topics' rather than a structured questionnaire. The participants are encouraged to discuss the issues amongst themselves and with the researcher in an informal and relaxed environment. The researcher records comments made by the participants (usually utilising a tape or video recorder). Figure 5.2 shows how this list of topics is arrived at.

**Figure 5.2 The process of developing a topic list for focus groups**



Source: J.L. Welch<sup>2</sup>

In contrast to a personal interview survey, the number of interviews in a typical group interview survey is very small, usually between 3 and 4 would be sufficient for each type of respondent-sector (e.g. farmers or manufacturers). Generally from the first interview on an unfamiliar subject the researcher will learn a great deal. The second and third interviews will produce more information, but not all of it will not be new. By the fourth interview most of what is revealed will have been covered before, and the diminishing returns involved would generally not justify the cost of further groups.

The participants within a focus group are selected in such a way that they exhibit a high degree of homogeneity with respect to either background, behaviour or both. Consider, for example, a study carried out by a small African nation that is looking for a niche market for a new range of sparkling wines. It is decided that, as a first step, a series of focus groups be conducted. The researchers are keen to ensure that each group comprises people who are similar in age and behaviour with respect to wine consumption. Figure 5.3 depicts the kind of screening questionnaire that the marketing researcher would use.

**WINE CONSUMPTION FOCUS GROUP SCREENER**

Hello, I am from Marketing Research Centre and we are conducting research among people who enjoy drinking wine and I would like to ask you a few questions.

1. Do you or does anyone in your household work in any of the following professions: marketing research, advertising, public relations, or in the production or distribution of wine?

Yes  terminate and tally  
 No  continue

2. Have you participated in a group discussion, survey, or been asked to test any products for market research purposes in the past 6 months?

Yes  terminate and tally  
 No  continue

3. Have you purchased and/or consumed any wine during the past 3 months?

Yes  terminate and tally  
 No  continue

4. Are you currently under medical treatment which prevents you from drinking wine at the present time?

Yes  terminate and tally  
 No  continue

5. Next I am going to read you a list of statements about drinking wine. Please tell me if any of the following statements apply to yourself. (Circle the letters that appear alongside the statements that apply to you).

a. I prefer sparkling wines to any other type.  
 b. I often drink sparkling wines although it is not my preferred type of wine.  
 c. I only occasionally drink sparkling wine.  
 d. I have tried sparkling wine and did not like it so I never drink it.  
 e. I have never tried sparkling wine.

6. Which of the following groups include your age?

under 18	<input type="checkbox"/>	terminate
18 - 24	<input type="checkbox"/>	
25 - 29	<input type="checkbox"/>	
30 - 39	<input type="checkbox"/>	
40 - 49	<input type="checkbox"/>	
50 - 59	<input type="checkbox"/>	
60 and older	<input type="checkbox"/>	terminate

7. Sex (by observation)

Male	<input type="checkbox"/>	check quotas
Female	<input type="checkbox"/>	check quotas

Figure 5.3 An example of a screening questionnaire

The first two questions will eliminate those who are likely to be too aware of the focus group process and distracted from the research topic. Questions 3 and 4 prevent those whose experience of wine consumption is not sufficiently recent from taking part. Question 5 would enable the researcher to allocate prospective participants to homogeneous groups. Thus, for example, there may be a group comprised entirely of people whose favourite wine is one of the sparkling wines. Other groups would be made up of people who have never tried sparkling wine and another may involve those who have tried and rejected sparkling wine. Clearly, the line of questioning would be different in emphasis for each of these groups. Question 6 also helps the researcher balance groups in terms of age distribution or he/she can make sure that only people within a narrow age range participate in a particular group. The seventh question allows the researchers to keep to whatever male/female ratios are appropriate given the research topic.

One has a choice of three different types of venue for group interviews, each having particular advantages and problems. Firstly, one could hold interviews at or near farmers' or manufacturers' residences. Such a venue has the advantage that the participants would feel they are on safe ground and may therefore feel more secure to express candid opinions, and also the advantage that the participants do not incur expense in attending the interview. However, such a venue can be problematic to organise, costly for transportation if equipment is to be demonstrated, and it can be difficult for the researcher to retain control over the interviewing environment.

Secondly, one could select a 'neutral' location such as a government agricultural research centre or a hotel. Again, here, one might avoid respondents' fears of attending, but there are still the problems associated with organisation, transportation of equipment, and the deterring cost involved for those participants who have to travel to the venue.

Group discussions can be invaluable research instruments for investigating why individuals behave in a particular way. They can be used to uncover motives, attitudes, and opinions through observing and recording the way the individuals interact in a group environment. Group discussions are used primarily to generate in-depth qualitative information rather than quantitative data, and are generally applied in the context of evaluating individuals' reactions to existing products or new product/concept ideas.

**Figure 5.4 Structuring a focus group session**

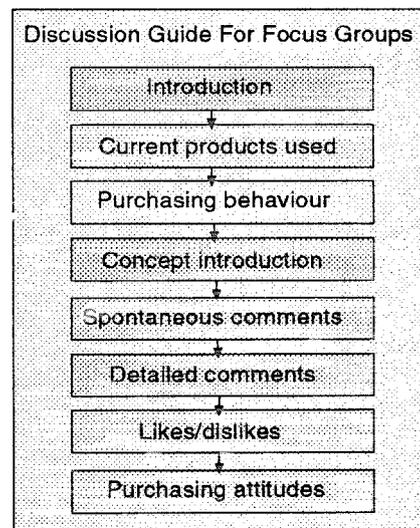


Figure 5.4 gives an outline of how a focus group session is typically structured. This example assumes that the problem to hand involves a concept (or idea) for a new product.

Group discussions are also useful as a cost-effective means of generating background information and hypotheses on a particular subject prior to the launch of a quantitative survey. In this respect group interviews can have advantages over personal interviews in a number of ways :

**Synergism:** The combined effort of the group will produce a wider range of information, insight, and ideas than will the accumulation of responses of a number of individuals when these replies are secured in personal interviews.

**Snowballing:** A bandwagon effect often operates in that a comment by one person triggers a chain of responses from other participants.

**Stimulation:** Usually after a brief introductory period the participants become enthusiastic to express their ideas and feelings as the group begins to interact. In a personal interview, the respondent may not be willing to expose his/her views for fear of having to defend his/her view or fear of appearing 'unconcerned' or 'radical'. Like most animals, the human being feels safer psychologically - as well physically - when he/she is in a group.

**Spontaneity:** Since no individual is required to answer any given question in a group interview, the individual's responses can be more spontaneous, less conventional, and should provide a more accurate picture of his position on some issues. In short, respondents are able to speak when they have definite feelings about a subject and not because a question requires an answer.

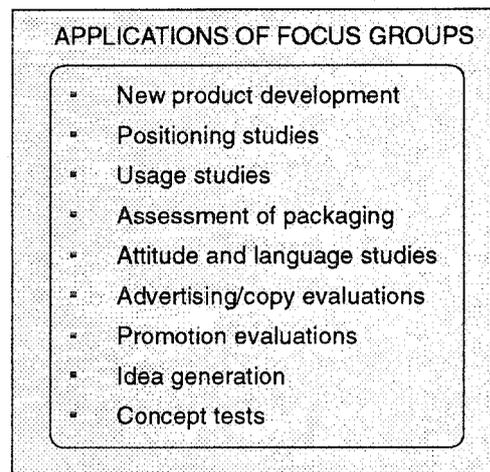
**Serendipity:** It is more often the case in a group interview than a personal interview that unexpected responses or ideas are put forward by participants. The group dynamics encourages ideas to develop more fully.

**Specialisation:** The group interview allows the use of a more highly trained, but more expensive, interviewer since a number of individuals are being 'interviewed' simultaneously.

**Scientific scrutiny** It allows closer scrutiny in several ways: the session can be observed by several observers. This allows some check on the consistency of the interpretations. The session can be taped or even video-taped. Later detailed examination of the recorded session allows the opportunity of additional insight and also can help clear up points of disagreement among analysts with regard to exactly what happened.

Figure 5.5 lists some of the main applications of focus groups in marketing research.

Figure 5.5 Applications of focus groups



## Problems with group interviews

While group interviews have many advantages as a research instrument for market research it should be borne in mind that they also have inherent problems. Careful planning and management is required to obtain the most value from group-based surveys.

**Qualitative data:** The researcher cannot produce hard quantitative data or conduct elaborate statistical analysis because of the usually small number of participants involved in group surveys. It is unlikely that one will be able to include a statistically representative sample of respondents from the population being studied.

**Analysis:** Analysis of the dialogue produced by group interviews can be a difficult and time-consuming process. This point was made earlier where the time taken to create transcripts from brief notes or tape recordings can take many tedious hours. Thereafter the researcher has to analyse and interpret these transcripts.

## Potential biases

There are many potential opportunities for bias to creep into the results of group discussions:

- Some participants may feel they cannot give their true opinions due to the psychological pressure on them arising from their concern as to what other members of the group may think. Some may feel tempted to give opinions that they feel will be respected by the group.
- The presence of one or two 'dominant' participants may repress the opinions of others. Some may not feel confident about expressing an opinion. Some may prefer to submit to the opinions of others rather than cause conflict/argument to develop.

**Comparisons across groups:** When a number of group interviews are being conducted, comparisons of the results between groups can be hampered if the setting, mix of participants, and/or interviewer is varied. Different interviewers may vary the way they ask questions and vary the order of questions in response to the answers being given. Differences in the settings of different groups may produce variability in the quality of results.

These potential problems should not be taken as reasons for avoiding using group discussions. The advantages far outweigh the problems, and careful planning and management will avoid many difficulties arising in the first place.

## Role of the researcher/moderator in discussion group

The researcher organising the group discussion acts as a 'moderator' not an interviewer. The purpose of the interview technique is to get others talking and interacting amongst themselves, and does not involve an interviewer asking them a pre-set series of questions. The role of the researcher is thus to moderate the discussion, encouraging participants to talk, prompting the discussion in appropriate directions to ensure all issues are covered, and changing the direction of the discussion when a point is felt to have been sufficiently covered. The moderator is also required to 'control' the group interaction to ensure that the viewpoints of all participants are allowed to be expressed.

In every interview situation one will find three types of participant who will need to be controlled:

**The Monopolist:** the participant who wants to do all the talking. The moderator must allow him/her a say, but ensure that he/she is quietened when others wish to express an opinion.

**The Silent Shy :** The participant who cannot bring himself to participate. Direct questioning of such individuals is often necessary to produce full co-operation and contribution.

**The Silent Aggressive:** The participant that has plenty to say, but believes he is no good at articulating it. The moderator needs to probe his feelings and have these discussed by the others in the group.

The moderator has to identify and minimise the effect of these types of participant. By anticipating the likely behaviour of individuals, the moderator can be in a better position to maintain continuity and an easy exchange of opinions and thoughts between individuals.

Questions and prompts must be completely free of bias. The discussion must consist of genuine opinions of the group participants and not 'assisted answers'. The neutrality of the moderator must be maintained at all times. It is also important to ensure that the interview atmosphere is not too artificial. In group interviews which aim to uncover attitudes towards products, it is always helpful to have the product concerned available (and, if possible, demonstrated or tried by respondents) to elicit realistic and valid opinions.

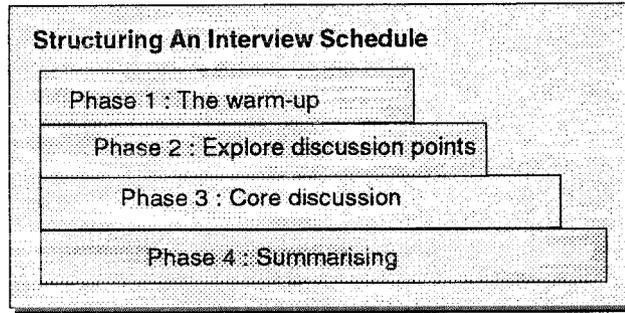
It is important in the group interview situation that the moderator is not so involved in writing/recording participants' comments that he cannot listen or react to the discussion which ensues. For this reason it is recommended that group interviews are tape-recorded (audio or visual, where possible). Subsequent analysis can then be more comprehensive, more rigorous and can be conducted at a more leisurely pace.

Due to the nature of group discussions and the number of participants involved, the data obtained can only be qualitative. Analysis is problematic (particularly in deciphering which participant said what) but appropriate qualitative techniques are available and should always be used. Tape recordings of discussions should be fully transcribed, reduced and processed, and their content analysed.

## Constructing the interview schedule

The interview schedule has at least four distinct sections: the warm-up, exploration of discussion points, the core discussion section and a summary.

**Figure 5.6 Structuring an interview Schedule**



**The warm-up:** This section has the objective of creating an atmosphere conducive to an open and free-flowing discussion. One technique that can be used to break down the initial bashfulness among group members who, in most instances, are strangers to one another is to divide them into pairs and exchange simple facts about themselves (e.g. their names, details of the families, place of work, interests etc.). Each group member is then asked to introduce their neighbour to the rest of the group.

The warm-up phase of the session then moves on to encourage the group members to engage in a free-ranging discussion around the topic upon which the discussion will eventually focus. For example, a municipal authority considering establishing a new fruit and vegetable wholesale market positioned outside a congested city centre would ultimately wish to determine what innovative facilities might attract traders to use the new market which is less convenient to them in terms of location. During the warm-up phase the moderator will direct the discussion in such a way as to obtain general information on how participants currently behave with respect to the topic, issue or phenomenon under investigation. The emphasis is upon a **description** of current behaviour and attitudes. For instance, the traders would be asked to describe their own modes of operation within the wholesale market as well as those of fellow traders.

**Exploration of discussion points:** In this phase the discussion moves on to the participants' attitudes, opinions and experiences of existing products, services (or in this case facilities) and on to what they like and dislike about those products/services. With reference to the wholesale markets example, at this stage traders would be invited to comment on the advantages and disadvantages of the facilities within which they currently operate.

**Core discussion:** This part of the group discussion focuses directly upon the principal purpose of the research. The flow of the session moves on to the participants' perceptions of new concepts, possible developments or innovations. The wholesale traders, for instance, would be guided towards discussing peri-urban wholesale markets and the kinds of facilities which might attract traders like themselves. A common approach is to follow a sequence of first exploring the ideas which participants generate themselves and then to solicit participants' reactions to ideas preconceived by researchers, or their clients, about possible future developments.

**Summary:** The final phase of the focus groups session allows participants to reflect upon the foregoing discussion and to add any views or information on the topic that they may have previously forgotten or otherwise have omitted. A common tactic is to conclude the session by inviting the group, as well as its individual members, to "advise the manufacturer" (or whoever) on the issue at hand.

## Chapter Summary

Interviews may be either structured or unstructured. In the case of the former, the interviewer has well defined questions presented in a set sequence. Such questionnaires can only be used when a certain amount is already known about the topic/situation being studied. The unstructured interview, where the researcher has only a list of topics which can be added to or changed in the course of the interview, is employed when little is known about the subject of study.

The depth interview is a one-to-one encounter, concluded at length, that enables the researcher to tackle sensitive and/or potentially embarrassing topics with the individual. Depth interviews are also useful when the decisions or behaviour under study are complex.

Telephone interviews, though common in the developed world, are relatively rare in the developing world because of the low level of telephone ownership. In developing countries, telephone interviews are more often confined to industrial marketing research. The latest development in this field is computer - aided - telephone - interviewing.

Bias can originate from the respondent and/or the interviewer. Respondent bias arises from poor memory, exaggeration or dishonesty, a lack of rapport with the interviewer or a misunderstanding over the purpose of the interview. Interview bias is most often due to a lack of objectivity and/or failure to administer questions properly and consistently.

Focus group interviews involve small groups of 6-8 individuals who are encouraged to discuss a topic and are prevented from straying from that topic by a moderator. The moderator is armed only with a list of issues/topics to guide the discussion and, therefore, the focus group is an unstructured group interview and gives rise to qualitative data.

## Key Terms

CATI	Moderator	Structured standardised interview
Depth interviews	Interview schedule	Snowballing
Error and bias	Screening questionnaire	Telephone interviews
Focus groups	Group interviews	Structured/unstructured interviews
Interview/respondent bias	Serendipity	Unstructured informal interview

## Review Questions

From your knowledge of the material in this chapter, give brief answers to the following questions:

1. What steps can the researcher take to increase the probability of obtaining the respondent's cooperation?
2. What are the causes of respondent bias in personal interviews?
3. How many participants should be involved in a focus group session?
4. What name is given to the interviewer leading a focus group session?
5. Outline the possible problems that can arise from using focus groups
6. What is meant by a 'structured interview'?

## Chapter References

1. Dillon, W. R. Madden, T. J. and Firtle, N. H. (1994), *Marketing Research in a Marketing Environment*, 3rd edition, Irwin, p. 124-125.
2. Welch, J. L. (1985). "Research Marketing Problems and Opportunities With Focus Groups", *Industrial Marketing Management*, 14, p. 247.

# Experimentation

## Chapter

## 6

The popularity of experimentation in marketing research has much to do with the possibilities of establishing cause and effect. Experiments can be configured in such a way as to allow the variable causing a particular effect to be isolated. Other methods commonly used in marketing research, like surveys, provide much more ambiguous findings. In fact, experimentation is the most scientific method employed in marketing research.

### Chapter Objectives

Having read this chapter the reader should:

- Understand the basic concepts of experimentation: experimental design, treatments, confounding factors and extraneous causal factors
- Be familiar with the different bases for inferring causal relationships
- Recognise the principal impediments to valid experimental results, and
- Be familiar with the main forms which experimental designs can take.

### Structure Of The Chapter

A definition of experiments is given at the outset of the chapter and then there follows a brief outline of the basic concepts of experimentation: dependency, causality and inference. The discussion then moves to the impediments to valid results in experimentation. A distinction is drawn between internal and external validity. The final section of the chapter gives an account of the main experimental designs used in marketing research.

## A definition of experiments

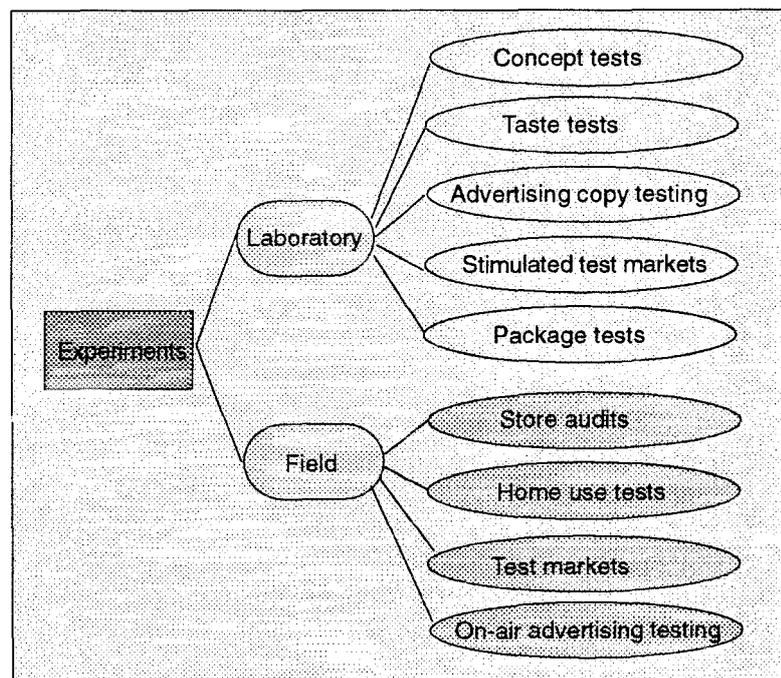
An experiment involves the creation of a contrived situation in order that the researcher can manipulate one or more variables whilst controlling all of the others and measuring the resultant effects. For instance, when United Fruits were considering replacing their Gros Michel variety of banana with the Valery variety, a simple experiment was first carried out. In selected retail outlets, the two varieties were switched on different days of the week and sales data examined to determine what effect the variety had on sales volumes. That is, the variety was being manipulated whilst all other variables were held constant. United Fruits found that the switch back and forth between Gros Michel and Valery had no effect upon sales. United Fruit were therefore able to replace Gros Michel with Valery.

Boyd and Westfall<sup>1</sup> have defined experimentation as:

"...that research process in which one or more variables are manipulated under conditions which permit the collection of data which show the effects, if any, in unconfused fashion."

Experiments can be conducted either in the field or in a laboratory setting. When operating within a laboratory environment, the researcher has direct control over most, if not all, of the variables that could impact upon the outcome of the experiment. For example, an agricultural research station may wish to compare the acceptability of a new variety of maize. Since the taste characteristics are likely to have a major influence on the level of acceptance, a blind taste panels might be set up where volunteers are given small portions of maize porridge in unmarked bowls. The participants would perhaps be given two porridge samples and the researcher would observe whether they were able to distinguish between the maize varieties and which they preferred. In addition to taste testing, laboratory experiments are widely used by marketing researchers in concept testing, package testing, advertising research and test marketing.

**Figure 6.1** Types of experiment used in marketing research



When experiments are conducted within a natural setting then they are termed field experiments. The variety test carried out by United Fruits on their Gros Michel and Valery bananas is an example

of a field experiment. The researcher obviously has less control over variables likely to have an effect upon the experimental variable but will strive to exert whatever control is possible.

## Basic concepts in experimentation

**Dependency:** Experiments allow marketing researchers to study the effects of an independent variable on a dependent variable. The researcher is able to manipulate the independent variable (i.e. he/she is able to change the value of the independent variable) and observe what effect, if any, this has upon the value of the dependent variable. Put another way, an independent variable is one which can be manipulated independently of other variables. Independent variables are selected for inclusion in an experiment on the basis of an assumption that they are in some way related to the dependent variable being studied. It is for this reason that independent variables are on occasion referred to as explanatory variables. The dependent variable is the one under study. The researcher begins from the premise that changes in the value of the dependent variable are at least in part caused by changes in the independent variable. The experiment is designed to determine whether or not this cause and effect relationship actually exists.

**Causality:** A causal relationship is said to exist where the value of one variable is known to determine or influence the value of another. Green et al.<sup>3</sup> draw a distinction between two types of causation: deterministic and probabilistic.

Where the independent variable (X) wholly explains changes in the value of the dependent variable (Y) and the researcher is able to establish the functional relationship between the two variables then this can be expressed as follows:

$$y = f(x)$$

In this case, it is said that X is both a necessary and a sufficient condition for Y to occur. The value of Y is determined by X, and X alone. Thus it can be said, in these circumstances, that X is a deterministic cause of Y. An illustrative example would be where the demand for agricultural commodities, say sugar, is dependent upon the world price. Further suppose that the functional relationship between sugar demand and world prices is known, then the formula becomes:

$$\text{Changes in demand for sugar (grade No.6)} = f(\text{World Price})$$

Whilst this example serves to illustrate the point it is rare to find such relationships when studying marketing problems. In most instances, the value of the dependent variable will be a function of several variables. For instance, only in exceptional cases would the demand for a product, even a commodity, depend solely upon price movements. Factors such as the reputation of the supplier, terms of sale, promotional activities, packaging etc., are likely to have an impact on demand as well. A more common causal model is one where the value of the dependent variable is a function of several independent variables.

Marketing problems are more often multivariate than univariate and so the relationship between dependent and independent variables is more often probabilistic than deterministic. A probabilistic relationship could be expressed as:

$$y = f(x_1, x_2, \dots, x_n).$$

What is depicted here is a situation where the dependent variable (y) is a function of several variables ( $x_1, x_2, \dots, x_n$ ). If marketing research can establish the form of the relationship (f) between the independent variables and also between the independent and dependent variables then the

value of  $y$  can be predicted. In this instance  $x_1$ , for example, is a necessary but not sufficient condition for  $y$  to occur. The same is true of each of the other independent variables. Rather, each individual independent variable is said to be a probabilistic cause of the value of  $y$ .

## Inferring causal relationships

The evidence for drawing inferences about causal relationships can take three forms: associative variation, consistent ordering of events and the absence of alternative causes.

Associative variation	Causality cannot be established unless there is associative, or concomitant, variation. That is, the data must show that a change in one variable is almost always accompanied by a change in the other.
Consistent order of events	If variable A causes variable B, then variable A must occur before or simultaneously with B, and not after it. It can happen that two events cause and effect one another. For example, the uptake of marketing innovations among farmers may show a high correlation with the number of visits by extension personnel. Closer study could reveal that extension personnel visit farmers who are immediately responsive to them more frequently than they do other farmers.
Absence of other causes	Before inferring causation researchers should check for equally plausible alternative explanations for the phenomenon under study. A vegetable trader might, for example, assume that the increase in her sales is due to improved grading procedures which she has introduced. However, there may be several other factors that act individually, or in combination, to bring about the sales increase. The trader might find her competitors are experiencing similar sales increases and that this is actually due to upward shifts in disposable incomes.

It should be noted that none of these forms of evidence, nor all three in combination, can unequivocally prove that a relationship exists. Rather, they help put the notion that a relationship exists beyond reasonable doubt. If all evidence points towards the same conclusion then the conclusion that a relationship exists is all the more compelling.

## Impediments to valid results from experiments

The validity of experimental results, i.e. the extent to which results reflect the truth, is obviously a matter of importance. There are two distinct forms of validity which marketing researchers are concerned about when using experimentation: internal and external validity.

Internal validity	The question being asked is whether the experimental treatment is actually responsible for changes in the value of the dependent variable or if confounding factors have been in operation. Since laboratory experiments afford greater opportunities for controlling extraneous or confounding variables than do field experiments, internal validity is a bigger problem in the case of the latter.
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**External validity** External validity has to do with the extent to which experimental findings can be generalised to the population from which the participants in the experiment were drawn. In other words, the issue is the degree to which the sample represents the population. Given the naturalistic setting of field experiments, this category generally provides greater external validity than do those experiments conducted within a laboratory environment.

In some cases the marketing researcher seeks to exclude extraneous factors that can confound the results of an experiment. However, this is not always possible since it is difficult to determine when certain types of extraneous variable is in operation and even more difficult to measure them. In these circumstances, the researcher will seek to control confounding variables in a different way. Examples of confounding are:

**Internal validity**

**History:** events taking place at the same time as the experiment is underway

**Pre-testing:** errors arising from the process of taking "before" and "after" measures from the same sample as that providing "after" measures

**Maturation:** biological and/or psychological changes in participants

**Instrumentation:** changes in the calibration of measurement instruments, questionnaires, interviewers or interviewing technique

**Sampling bias:** assignment of participants to experimental groups in a way likely to prejudice outcomes

**Mortality:** differential loss of participants from experimental groups

**External validity**

**Interactive effects of testing:** pre-exposure measurements going rise to heightened awareness

**Interactive effects of sampling bias:** non-random assignment of participants to experimental groups leading to differing responses to the experimental treatment

**Contrived situations:** experimental setting elicits responses that differ from those which would be obtained in the real world.

**Internal validity**

**History:** The term 'history' has been used to describe events that happen whilst the experiment is underway and serve to distort experimental results. A common occurrence is when a commercial organisation is testing a new product within a small geographical area, prior to launching the product nationwide, and competitors intentionally set out to distort test results by giving additional promotional support to their own competing product and/or by cutting the price of their product.

**Pretest effect:** It is sometimes considered necessary to take some preliminary measures before the main experiment is carried out. For instance, a company wishing to promote monogerm sugar beet seed in Pakistan wanted to first establish how much farmers

already knew about the different types of seed available. A particular district was chosen as a test area and a pretest was undertaken where a sample of farmers from that area were asked to list the types of seed of which they were aware. The farmers were also asked to list the brands of sugar beet seed with which they were familiar. This constituted the 'before' measure. A little later a promotional campaign was launched within the test area and after a period of time the sample of farmers were again visited and asked to identify the brands of seed with which they were familiar. It is likely that any increase in awareness of the company's brand was due, in part at least, to the heightened awareness of issues relating to seeds caused by the pretest activity. That is, the pretest is likely to increase interest in matters relating to seeds and therefore make farmers more attentive to the brand promotion than they otherwise might be.

**Maturation:** Maturation refers to biological and/or psychological changes to respondents that occur in the period between the 'before' and 'after' measurements and consequently affect the information which they provide. Experiments requiring the cooperation of respondents over a substantial period of time are most likely to suffer from maturation effects. Consumer and farmer panels are examples of experimental instruments that demand longer term participation by panel members. Suppose that a farmer panel were established to measure the level of adoption of new marketing practices or technologies promoted by agricultural extension officers. As the years pass the marketing extension officer has noted that farmers on the panel appear to be adopting fewer of the innovations being proposed by the extension service. However, the lower rates of adoption may not be explained by either the marketing extension service becoming less effective in communicating the benefits of innovative marketing practices and technologies nor by current innovations being somehow less appropriate or offering more marginal benefits. Rather, the explanation may be that the panel itself is aging and as farmers get older they may become more resistant to change. Certainly as people get older their needs and attitudes are subject to change. In these circumstances the data drawn from the panel is a function of the maturation of the panel rather than the experimental variables (i.e. the efforts of the marketing extension officers and the characteristics of the marketing innovations).

Whilst it is not always possible to adjust the experimental design so as to eliminate each of these potential threats to the validity of results, it is always possible to measure their impact upon results. The chief device for doing so is to include a 'control group'.

**Instrumentation:** From time to time, measurement instruments have to be recalibrated or their readings become suspect. Although marketing research does make use of a wide range of mechanical, electrical and electronic instruments in experiments that clearly require periodic readjustment, (e.g. tachistoscopes, pupilometers, audiometer) there are other, more commonly used, marketing research test instruments that also need to be checked for consistency, such as, questionnaires, interviewers, interviewing procedures.

Questionnaires may contain standardised questions with the challenge to consistency coming from the interpretation of the meaning of the question. Consider the apparently straight-forward question, "How big is your farm?" There are several equally valid responses to this question that could combine to give a totally misleading set of data. The variation is due to farmers' interpretation of what the researcher really wants to know. Some farmers will include only the land area that they had under crop in the year of the survey whilst others will include both productive and non-productive land. In other instances, farmers may understand the question to mean the area of land they actually own. Some farmers may believe it is the farmland that they own and/or rent.

Another aspect is that of consistency in the conduct of interviews. There can be variation in the data collected during an experiment if either different interviewers are used to collect data after the experiment from those who conducted interviews before the experiment; or interviewers change the way questions are put to participants as they become more familiar with the content of the questionnaire.

**Mortality:** Over time there is a danger that some participants will drop out of an experiment. This can happen when people literally die or decide to withdraw from an experimental group for one reason or another. This obviously changes the composition of the experimental group. Where the effects of a marketing variable are being studied by comparing data drawn either from two groups that have been matched to ensure that their composition is identical or the same group at different points in time then mortality can confound the results.

**Sampling bias:** Sampling bias occurs when the method of assigning participants to experimental groups results in groups whose behaviour cannot be compared to one another because they differ in some important respect(s). Consider the task of evaluating the implementation of new weighing and grading practices within a municipal grain market. It could be that it is easier for larger grain traders to adopt the new practices since they are better able to afford the grading and weighing equipment required. If during a field experiment conducted to study the rate of adoption two groups are established with a view to comparing the rate of adoption within them and one of those groups is predominantly comprised of larger (or smaller) traders then this is likely to distort the results.

## External validity

**Interactive effects of testing:** The design of the experiment itself may give rise to measurement variations between the "before" and "after" phases of the research. Consider a test of consumer acceptance involving two exotic rice varieties being evaluated as possible replacements for a popular indigenous variety which is suffering from a disease and is therefore in short supply. The experimental design involves leaving a trial pack of rice A with a sample of households and returning a few weeks later to interview members of the household about rice A and to deliver a second trial pack containing rice B. A third visit is subsequently made during which household members are asked questions about rice B. Respondents' assessment of rice B is not made under the same conditions as their assessment of rice A. When trying rice A the respondents are likely to have made comparisons, perhaps only subconsciously, with existing rice varieties that they already use. However, when evaluating rice B the respondents will also be making comparisons with rice A. This problem can be overcome, to some extent, by splitting the sample so that half are given the trial varieties in the order rice A then rice B; the remaining half are given the two varieties in the reverse order of rice B then rice A. A more difficult problem to overcome is that whatever the sequence of presentation, by the time household members are asked about the second trial variety, they have become more 'experienced' interviewees and respond differently simply because they feel they better understand what the interviewer wants and how to answer the questions. By the same measure, the interviewer becomes more experienced the second time around, having become more familiar with the product, the interviewing process, and the questionnaire (or interview schedule), and may pose the questions in a different way. As a result, the interviewer may elicit different information on the third call from that which was obtained on the second visit.

**Interactive effects of sampling bias:** It can happen that participants are assigned to an experimental group without due concern for possible bias and this then interacts with the experimental treatment producing a spurious outcome. Such an interactive sampling bias would result from unknowingly assigning heavy users

of a particular product category to one experimental group and using favourable responses to a new formulation within the category as the basis for projecting national demand.

**Contrived situations:** Any laboratory experiment is, by definition, unlike the real world. Typically, the researcher manipulates the situation so that only those variables in which he/she is immediately interested in studying are allowed to operate as they would in the real world. On occasion this leads to experimental results which are not replicated in the real world. An outstanding example of this set of circumstances is that of Coca Cola's infamous blind taste panels. Coca Cola was concerned at the creeping increases in market share of Coke's main competitor Pepsi. Coca Cola decided to conduct sensory analysis tests where participants were asked to score two colas on taste preference. The participants were given the colas in unmarked cups (i.e. a 'blind' tasting) before being asked which they preferred. On balance, the preference was of Pepsi's slightly sweeter cola. Coca Cola reacted in a way seldom seen anywhere in the world. The brand leader was removed from the market and a new, slightly sweeter formulation was launched under the Coca Cola brand name. It was to prove a costly mistake. Coca Cola were inundated by calls from consumers who were irate over the company's tampering with a product that has almost become a national institution. Most Americans have grown up with Coca Cola and could not accept that it could be changed. The company was forced to reintroduce the original formulation under the title of Coke Classic.

Coca Cola's taste panels were conducted in an artificial environment in which such variables as the brand name, the packaging and all the associations which go along with these were not allowed to operate. The research focused only on the taste characteristics of the product and a particular result was obtained. However, in the real world people consume Coca Cola for many reasons, many of them having little to do with the taste.

## Experimental designs

The process of experimentation is one of subjecting participants (e.g. target consumers, farmers, distributors etc.) to an independent variable such as an advertisement, a packaging design or a new product, and measuring the effect on a dependent variable (e.g. level of recall, sales or attitude scores).

### "After-only" designs

As the name suggests, with after-only experimental designs measures of the independent variable are only taken after the experimental subjects have been exposed to the independent variable. This is a common approach in advertising research where a sample of target customers are interviewed following exposure to an advertisement and their recall of the product, brand, or sales features is measured. The advertisement could be one appearing on national television and/or radio or may appear in magazines, newspapers or some other publication. The amount of information recalled by the sample is taken as an indication of the effectiveness of the advertisement.

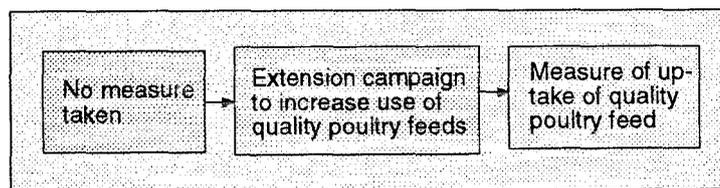


Figure 6.2 An example of an after-only design

The chief problem with after-only designs is that they do not afford any control over extraneous factors that could have influenced the post-exposure measurements. For example, marketing extension personnel might have completed a trial campaign to persuade small-scale poultry producers, in a localised area, to make use of better quality feeds in order to improve the marketability and price of the end product. The decision to extend the campaign to other districts will depend on the results of this trial. After-only measures are taken, following the campaign, by checking poultry feed sales with merchants operating within the area. Suppose a rise in sales of good quality poultry feed mixes occurs four weeks after the campaign ends. It would be dangerous to assume that this sales increase is wholly due to the work of the marketing extension officers. A large part of the increase may be due to other factors such as promotional activity on the part of feed manufacturers and merchants who took advantage of the campaign, of which they were forewarned, and timed their marketing programme to coincide with the extension campaign. If the extension service erroneously drew the conclusion that the sales increase was entirely due to their own promotional activity, then they might be misled into repeating the same campaign in other areas where there would not necessarily be the same response from feed manufacturers and merchants.

After-only designs are not true experiments since little or no control is exercised over any of the variables by the researcher. However its inclusion here serves to underline the need for more complex designs.

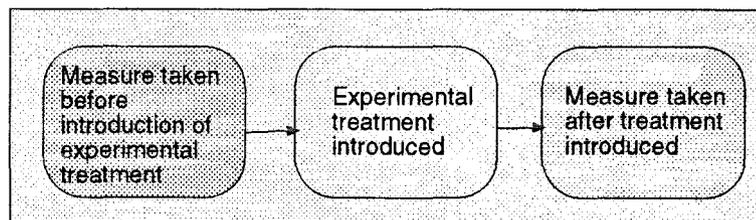
### "Before-after" designs

A before-after design involves the researcher in measuring the dependent variable both before and after the participants have been exposed to the independent variables.

The before-after design is an improvement upon the after-only design, in that the effect of the independent variable, if any, is established by observing differences between the value of the dependent variable before and after the experiment. Nonetheless, before-after designs still have a number of weaknesses.

Consider the case of the vegetable packer who is thinking about sending his/her produce to the wholesale market in more expensive, but more protective, plastic crates, instead of cardboard boxes. The packer is considering doing so in response to complaints from commissioning agents that the present packaging affords little protection to produce from handling damage. The packer wants to be sure that the economics of switching to plastic crates makes sense. Therefore, the packer introduces the plastic crates for a trial period. Before introducing these crates, the packer records the prices received for his/her top grade produce. Unless prices increase by more than the additional cost of plastic crates then there is no economic advantage to using the more expensive packaging.

**Figure 6.3 Before-after designs**



Suppose, for instance, that the packer was receiving \$15 per crate, when these were of the cardboard type, but that the price after the introduction of plastic crates had risen to \$17 per crate. The \$2 difference would be attributed to better quality produce reaching the market as a result of the protection afforded by the plastic crates. However, there are several equally plausible

explanations for the upward drift in produce prices including a shortfall in supply, a fall in the quality of produce supplied by competitors who operate in areas suffering adverse weather conditions, random fluctuation in prices, etc.

## "Before-after with control group" design

This design involves establishing two samples or groups of respondents: an experimental group that would be exposed to the marketing variable and a control group which would not be subjected to the marketing variable under study. The two groups would be matched. That is, the two samples would be identical in all important respects. The idea is that any confounding factors would impact equally on both groups and therefore any differences in the data drawn from the two groups can be attributed to the experimental variable.

Study figure 6.4 which depicts how an experiment involving the measurement of the impact of a sugar beet seed promotional campaign on brand awareness might be configured with a control group.

**Figure 6.4 An example of a before-after with control group design**

	Experimental Group	Control Group
'Before' measure: % recalling Brand X sugarbeet seed	25.5%	25.5%
Exposed to promotional campaign	Yes	No
'After' measure: % recalling Brand X sugarbeet seed	34.5%	24.5%

First, the two groups would be matched: attributes such as age distribution of group members, spread of sizes of farms operated, types of farms operated, ratio of dependence on hand tools, animal drawn tools and tractor mounted equipment, etc. would be matched within each group so that the groups are interchangeable for the purposes of the test. As figure 6.4 conveys, the initial level of awareness of the sugar beet brand would be recorded within each group. Only the experimental group would see the test promotional campaign. After the campaign, a second measure of brand awareness would be taken from each group. Any difference between the 'after' and 'before' measurements of the control group ( $C_2 - C_1$ ) would be due to uncontrolled variables. Differences between the 'after' and 'before' measurements in the experimental group ( $E_2 - E_1$ ) would be the result of the experimental variable plus the same uncontrolled variables affecting the control group. Isolating the effect of the experimental variable is simply a matter of subtracting the difference in the two measurements of the control group from the difference in the two measures taken from the experimental group. To illustrate the computation consider the following hypothetical figures.

Awareness of the brand within the experimental group has increased by 9 percent. At the same time, the awareness level, within the control group, appears to have fallen by 1 percent. This could be due to random fluctuations or a real lowering of awareness due to some respondents forgetting the brand in the absence of any supporting advertisements/promotions. Thus the effects of the test campaign would seem to have been:

$$\begin{aligned} \text{Effect of experimental variable} &= (34.5 - 25.5) - (24.5 - 25.5) \\ &= (9\%) - (-1\%) = 10\% \end{aligned}$$

If a "before and after with control group" experiment is properly designed and executed then the effects of maturation, pretesting and measurement variability should be the same for the experimental group as for the control group. In this case, these factors appear to have had a negative effect on awareness of one percent. Had it not been for the experimental variable, the experimental group would have shown a similar fall in awareness over the period of the test. Instead of recording a fall in the level of awareness of the sugar beet brand, the experimental group actually showed a nine percent increase in brand awareness. However, the design is not guaranteed to be unflawed. The accurate matching of the two groups is a difficult, some would say impossible, task. Moreover, over time the rate and extent of mortality, or drop out, is likely to vary between the groups and create additional problems in maintaining a close match between groups.

### **The "After-only with control group" experimental design**

Again, this design involves establishing two matched samples or groups of respondents. There is no measurement taken from either group before the experimental variable is introduced and the control group is not subsequently subjected to the experimental variable. Afterwards measures are taken from both groups and the effect of the experimental variable is established by deducting the control group measure from the experimental group measure. An illustrative example will help clarify the procedures followed.

A Sri Lankan food technology research institute was trying to convince small-scale food processors to adopt solar dryers to produce dried plantain and other dehydrated vegetables. Much of the initial resistance to the adoption of this technology was due to the belief that the taste characteristics of this snack food would be altered from those of traditional sun-dried plantain. The research institute was able to convince the food manufacturers that there would be no perceptible changes in the taste characteristics by carrying out an "after-only with control group" experiment. Sensory analysis experiments conclusively showed that almost none of the participants was able to discriminate between plantain dehydrated by means of the solar powered dryer and that which was sun-dried.

Many product tests are of the "after-only with control group" type. This design escapes the problems of pretesting, history and maturation. However, this form of "after-only design" does not facilitate an analysis of the process of change, whereas a comparable "before-after design" would. The attitudes, opinions and/or behaviour of individual participants can be recorded both before and afterwards and changes noted. For instance, the effect of the experimental variable on those participants who held unfavourable attitudes can be compared with those they held in the "before" measurement. Changes in those that held favourable attitudes in the "before" measurement can also be assessed after exposure to the experimental variable.

### ***Ex post facto* design**

The *ex post facto* design is a variation of the "after-only with control group" experimental design. The chief difference is that both the experimental and control groups are selected after the experimental variable is introduced rather than before. This approach eliminates the possibility that participants will be influenced by an awareness that they are being tested.

Following market liberalisation in Zimbabwe a number of maize meal producers, using hammer mill technology, came into the industry to compete against millers using roller mill technology. The hammer milled product was much coarser than the highly refined roller milled maize meal to which most urban consumers had grown accustomed. The hammer milled product, however, had superior nutritional benefits since meal produced in this way retained a much larger amount of the germ, bran and endosperm. One production miller sought to communicate the nutritional

advantages of hammer milled meal through point-of-sale material in stores and provisions merchants. A sample of consumers who claimed to have seen the point-of-sale material was subsequently assigned to an experimental group and a matching selection of consumers who denied having seen the point-of-sale material comprised the control group. It was hypothesised that those who had seen the point-of-sale material would suggest that hammer milled maize meal had superior nutritional properties to that of roller meal to a far greater extent than would those who had not seen the point-of-sale aids.

The results supported the hypothesis in as much as 68 percent of those recalling having seen the point-of-sale promotional aids reported hammer milled meal as nutritionally superior whilst only 43 percent of those unaware of the point-of-sale aids said that hammer mill was more nutritious than roller meal. However, some care has to be taken in making the conclusion that the point-of-sale campaign was an unqualified success. It is to be remembered that participants were assigned to the two groups on the basis of self-selection. Those reporting having seen the promotional material were probably those on whom the campaign had made most impression. It is quite likely that some of those in the control group also saw the material but do not recall having done so.

Where exposure to the experimental variable can be determined objectively, on an *ex post facto* basis, the bias introduced by self-selection can be eliminated and the design, in essence, becomes identical to the "after-only with control group" design. In these circumstances, the *ex post facto* design is an improvement upon the "after-only with control group" design since the experimental variable would have its impact in a natural situation. Suppose, for example, that government has been using radio to communicate the benefits of giving vitamin supplements to children under two years of age and that these are available in tablet form, free-of-charge, in local clinics. Ownership, and access, to a radio can be established objectively.

## Chapter Summary

Experimentation offers the possibility of establishing a cause and effective relationship between variables and this makes it an attractive methodology to marketing researchers. An experiment is a contrived situation that allows a researcher to manipulate one or more variables whilst controlling all of the others and measuring the resultant effects on some independent variable.

Experiments are of two types: those conducted in a laboratory setting and those which are executed in natural settings; these are referred to as field experiments. Laboratory experiments give the researcher direct control over most, if not all, of the variables that could affect the outcome of the experiment. The evidence for drawing inferences about causal relationships takes three forms: associative variation, consistent ordering of events and the absence of alternative causes.

There are a number of potential impediments to obtaining valid results from experiments. These may be categorised according to whether a given confounding factor has internal validity, external validity, or both. Internal validity is called into question when there is doubt that the experimental treatment is actually responsible for changes in the value of the dependent variable. External validity becomes an issue when there is uncertainty as to whether experimental findings can be generalised to a defined population. The impediments to internal validity are history, pre-testing, maturation, instrumentation, sampling bias and mortality. Impediments to external validity are: the interactive effects of testing, the interactive effects of sampling bias and errors arising from making use of contrived situations.

The main forms of experimental design differ according to whether or not a measure is taken both before and after the introduction of the experimental variable or treatment, and whether or not a

control group is used alongside the experimental group. The designs are: after-only, before-after, before-after with control group, after-only with control group and *ex post facto* designs.

## Key Terms

Causality	Experimental design	Independent variables
Confounding factors	<i>Ex post facto</i> measures	Internal validity
Control groups	External validity	Treatments
Dependent variables	Extraneous factors	

## Review Questions

1. Give the alternative name for 'the independent variable'.
2. Name 4 threats to the internal validity of experimental results.
3. What is the main device for controlling the effects of maturation in experimental groups?
4. In what way does the *ex post facto* experimental design differ from the after-only with control group design?
5. Define the term 'deterministic causation'.
6. What is meant by the term 'external validity'?
7. What are the 3 conditions necessary in order to be able to infer causation?
8. Why is it said that after-only designs are not true experiments?

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# Sampling In Marketing Research

## Chapter

## 7

Following decisions about how data is to be collected the next consideration is how to select a sample of the population of interest that is truly representative. At the same time, the requirement that samples be representative of the population from which they are drawn has to be offset against time and other resource considerations. This being the case, choices have to be made between the mathematically superior probabilistic sampling methods and the more pragmatic non-probability sampling methods.

### Chapter Objectives

This chapter serves to teach the reader to:

- Distinguish between probabilistic and non-probabilistic sampling methods
- Understand the bases for stratifying samples
- Make an informed choice between random and quota samples
- Comprehend multistage sampling, and
- Appreciate the use of area or aerial sampling.

### Structure Of The Chapter

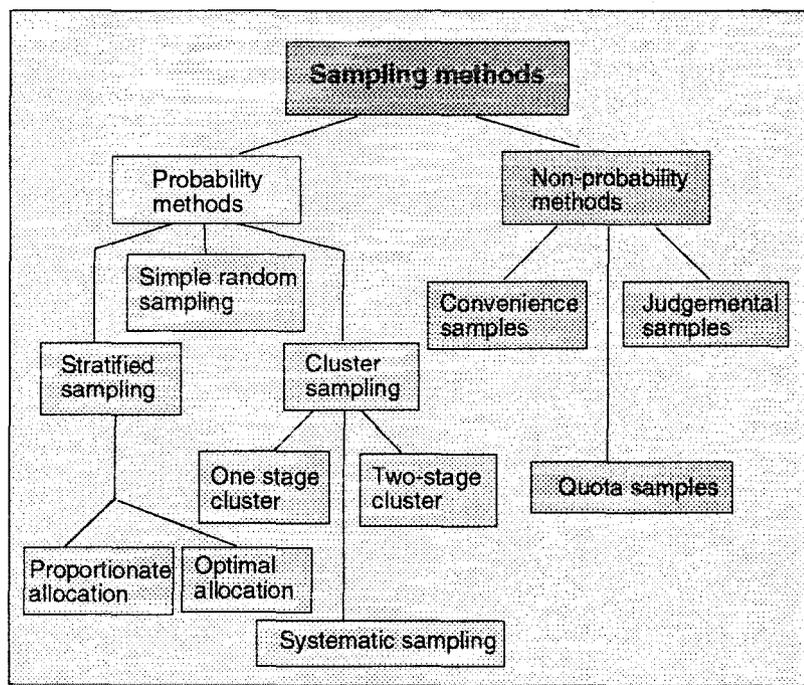
The early part of the chapter outlines the probabilistic sampling methods. These include simple random sampling, systematic sampling, stratified sampling and cluster sampling. Thereafter, the principal non-probability method, quota sampling, is explained and its strengths and weaknesses outlined. The statistical aspects of sampling are then explored. A number of illustrative calculations are presented.

Two major principles underlie all sample design. The first is the desire to avoid bias in the selection procedure; the second is to achieve the maximum precision for a given outlay of resources. Bias in the selection can arise :

- if the selection of the sample is done by some non-random method i.e. selection is consciously or unconsciously influenced by human choice
- if the sampling frame (i.e. list, index, population record) does not adequately cover the target population
- if some sections of the population are impossible to find or refuse to co-operate.

These cause selection or sample bias and can only be avoided if a random method is used. Other designs, to be described shortly, can retain the essential element of randomness but manage to increase precision by incorporating various restrictions and refinements. Figure 7.1 gives an overview of the sampling methods that are either explained within this chapter or are explored in the exercises which accompany this textbook.

**Figure 7.1 Methods of sampling**



It can be seen that there is a dichotomy - probability and non probability sampling methods. The text which follows explains these methods in some detail, and highlights the advantages and disadvantages of each method.

## Random sampling

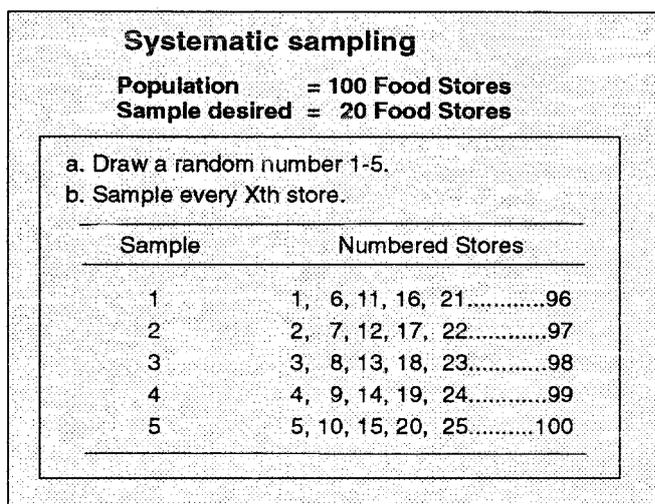
Random, or probability sampling, gives each member of the target population a known and equal probability of selection. The two basic procedures are :

- 1 the lottery method, e.g. picking numbers out of a hat or bag
- 2 the use of a table of random numbers.

## Systematic sampling

Systematic sampling is a modification of random sampling. To arrive at a systematic sample we simply calculate the desired sampling fraction, e.g. if there are 100 distributors of a particular product in which we are interested and our budget allows us to sample say 20 of them then we divide 100 by 20 and get the sampling fraction 5. Thereafter we go through our sampling frame selecting every 5th

distributor. In the purest sense this does not give rise to a true random sample since some systematic arrangement is used in listing and not every distributor has a chance of being selected once the sampling fraction is calculated. However, because there is no conscious control of precisely which distributors are selected, all but the most pedantic of practitioners would treat a systematic sample as though it were a true random sample.



**Figure 7.2 Systematic sampling as applied to a survey of retailers**

## Stratified samples

Stratification increases precision without increasing sample size. Stratification does not imply any departure from the principles of randomness. It merely denotes that before any selection takes place, the population is divided into a number of strata, then random samples taken within each stratum. It is only possible to do this if the distribution of the population with respect to a particular factor is known, and if it is also known to which stratum each member of the population belongs. Examples of characteristics which could be used in marketing to stratify a population include: income, age, sex, race, geographical region, possession of a particular commodity.

Stratification can occur after selection of individuals, e.g. if one wanted to stratify a sample of individuals in a town by age, one could easily get figures of the age distribution, but if there is no general population list showing the age distribution, prior stratification would not be possible. What might have to be done in this case at the analysis stage is to correct proportional representation. Weighting can easily destroy the assumptions one is able to make when interpreting data gathered from a random sample and so stratification prior to selection is advisable. Random stratified sampling is more precise and more convenient than simple random sampling.

When stratified sampling designs are to be employed, there are 3 key questions which have to be immediately addressed :

- 1 The bases of stratification, i.e. what characteristics should be used to subdivide the universe/population into strata?
- 2 The number of strata, i.e. how many strata should be constructed and what stratum boundaries should be used?
- 3 Sample sizes within strata, i.e. how many observations should be taken in each stratum?

## Bases of stratification

Intuitively, it seems clear that the best basis would be the frequency distribution of the principal variable being studied. For example, in a study of coffee consumption we may believe that behavioural patterns will vary according to whether a particular respondent drinks a lot of coffee, only a moderate amount of coffee or drinks coffee very occasionally. Thus we may consider that to stratify according to "heavy users", "moderate users" and "light users" would provide an optimum stratification. However,

two difficulties may arise in attempting to proceed in this way. First, there is usually interest in many variables, not just one, and stratification on the basis of one may not provide the best stratification for the others. Secondly, even if one survey variable is of primary importance, current data on its frequency is unlikely to be available. However, the latter complaint can be attended to since it is possible to stratify after the data has been completed and before the analysis is undertaken. The only approach is to create strata on the basis of variables, for which information is, or can be made available, that are believed to be highly correlated with the principal survey characteristics of interest, e.g. age, socio-economic group, sex, farm size, firm size, etc.

In general, it is desirable to make up strata in such a way that the sampling units within strata are as similar as possible. In this way a relatively limited sample within each stratum will provide a generally precise estimate of the mean of that stratum. Similarly it is important to maximise differences in stratum means for the key survey variables of interest. This is desirable since stratification has the effect of removing differences between stratum means from the sampling error.

Total variance within a population has two types of natural variation: between-strata variance and within-strata variance. Stratification removes the second type of variance from the calculation of the standard error. Suppose, for example, we stratified students in a particular university by subject speciality - marketing, engineering, chemistry, computer science, mathematics, history, geography etc. and questioned them about the distinctions between training and education. The theory goes that without stratification we would expect variation in the views expressed by students from say within the marketing speciality and between the views of marketing students, as a whole, and engineering students as a whole. Stratification ensures that variation between strata does not enter into the standard error by taking account of this source in drawing the sample.

## Number of strata

The next question is that of the number of strata and the construction of stratum boundaries. As regards number of strata, as many as possible should be used. If each stratum could be made as homogeneous as possible, its mean could be estimated with high reliability and, in turn, the population mean could be estimated with high precision. However, some practical problems limit the desirability of a large number of strata :

- 1 No stratification scheme will completely "explain" the variability among a set of observations. Past a certain point, the "residual" or "unexplained" variation will dominate, and little improvement will be effected by creating more strata.
- 2 Depending on the costs of stratification, a point may be reached quickly where creation of additional strata is economically unproductive.

If a single overall estimate is to be made (e.g. the average per capita consumption of coffee) we would normally use no more than about 6 strata. If estimates are required for population subgroups (e.g. by region and/or age group), then more strata may be justified.

## Sample sizes within strata

**Proportional allocation:** Once strata have been established, the question becomes, "How big a sample must be drawn from each ?" Consider a situation where a survey of a two-stratum population is to be carried out:

Stratum	Number of Items in Stratum
A	10,000
B	90,000

If the budget is fixed at \$3000 and we know the cost per observation is \$6 in each stratum, so the available total sample size is 500. The most common approach would be to sample the same

proportion of items in each stratum. This is termed proportional allocation. In this example, the overall sampling fraction is:-

$$\frac{\text{Sample size}}{\text{Population size}} = \frac{500}{10,000} = 0.05$$

Thus, this method of allocation would result in:

Stratum A (10,000 x 0.05) = 500  
 Stratum B (90,000 x 0.05) = 4500

The major practical advantage of proportional allocation is that it leads to estimates which are computationally simple. Where proportional sampling has been employed we do not need to weight the means of the individual stratum when calculating the overall mean. So:

$$\bar{X}_{sr} = W_1\bar{X}_1 + W_2\bar{X}_2 + W_3\bar{X}_3 + \dots + W_k\bar{X}_k$$

**Optimum allocation:** Proportional allocation is advisable when all we know of the strata is their sizes. In situations where the standard deviations of the strata are known it may be advantageous to make a disproportionate allocation.

Suppose that, once again, we had stratum A and stratum B, but we know that the individuals assigned to stratum A were more varied with respect to their opinions than those assigned to stratum B. Optimum allocation minimises the standard error of the estimated mean by ensuring that more respondents are assigned to the stratum within which there is greatest variation.

## Quota sampling

Quota sampling is a method of stratified sampling in which the selection within strata is non-random. Selection is normally left to the discretion of the interviewer and it is this characteristic which destroys any pretensions towards randomness.

## Quota v random sampling

The advantages and disadvantages of quota versus probability samples has been a subject of controversy for many years. Some practitioners hold the quota sample method to be so unreliable and prone to bias as to be almost worthless. Others think that although it is clearly less sound theoretically than probability sampling, it can be used safely in certain circumstances. Still others believe that with adequate safeguards quota sampling can be made highly reliable and that the extra cost of probability sampling is not worthwhile.

Generally, statisticians criticise the method for its theoretical weakness while market researchers defend it for its cheapness and administrative convenience.

## Main arguments against : Quota sampling

- 1 It is not possible to estimate sampling errors with quota sampling because of the absence of randomness.  
 Some people argue that sampling errors are so small compared with all the other errors and biases that enter into a survey that not being able to estimate is no great disadvantage. One does not have the security, though, of being able to measure and control these errors.
- 2 The interviewer may fail to secure a representative sample of respondents in quota sampling. For example, are those in the over 65 age group spread over all the age range or clustered around 65 and 66?
- 3 Social class controls leave a lot to the interviewer's judgement.

- 4 Strict control of fieldwork is more difficult, i.e. did interviewers place respondents in groups where cases are needed rather than in those to which they belong.

## Main arguments for : quota sampling

- 1 Quota sampling is less costly. A quota interview on average costs only half or a third as much as a random interview, but we must remember that precision is lost.
- 2 It is easy administratively. The labour of random selection is avoided, and so are the headaches of non-contact and callbacks.
- 3 If fieldwork has to be done quickly, perhaps to reduce memory errors, quota sampling may be the only possibility, e.g. to obtain immediate public reaction to some event.
4. Quota sampling is independent of the existence of sampling frames.

## Cluster and multistage sampling

**Cluster sampling:** The process of sampling complete groups or units is called cluster sampling. Situations where there is any sub-sampling within the clusters chosen at the first stage are covered by the term multistage sampling. For example, suppose that a survey is to be done in a large town and that the unit of inquiry (i.e. the unit from which data are to be gathered) is the individual household. Suppose further that the town contains 20,000 households, all of them listed on convenient records, and that a sample of 200 households is to be selected. One approach would be to pick the 200 by some random method. However, this would spread the sample over the whole town, with consequent high fieldwork costs and much inconvenience. (All the more so if the survey were to be conducted in rural areas, especially in developing countries where rural areas are sparsely populated and access difficult). One might decide therefore to concentrate the sample in a few parts of the town and it may be assumed for simplicity that the town is divided into 400 areas with 50 households in each. A simple course would be to select say 4 areas at random (i.e. 1 in 100) and include all the households within these areas in our sample. The overall probability of selection is unchanged, but by selecting clusters of households, one has materially simplified and made cheaper the fieldwork.

A large number of small clusters is better, all other things being equal, than a small number of large clusters. Whether single stage cluster sampling proves to be as statistically efficient as a simple random sampling depends upon the degree of homogeneity within clusters. If respondents within clusters are homogeneous with respect to such things as income, socio-economic class etc., they do not fully represent the population and will, therefore, provide larger standard errors. On the other hand, the lower cost of cluster sampling often outweighs the disadvantages of statistical inefficiency. In short, cluster sampling tends to offer greater reliability for a given cost rather than greater reliability for a given sample size.

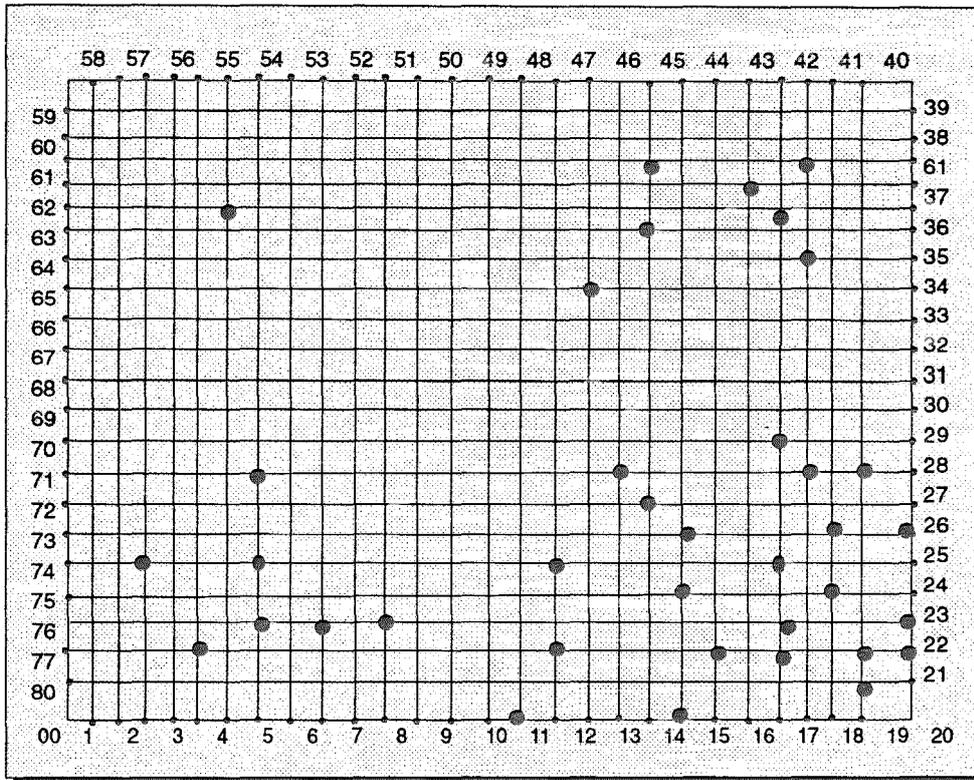
**Multistage sampling:** The population is regarded as being composed of a number of first stage or primary sampling units (PSU's) each of them being made up of a number of second stage units in each selected PSU and so the procedure continues down to the final sampling unit, with the sampling ideally being random at each stage.

The necessity of multistage sampling is easily established. PSU's for national surveys are often administrative districts, urban districts or parliamentary constituencies. Within the selected PSU one may go direct to the final sampling units, such as individuals, households or addresses, in which case we have a two-stage sample. It would be more usual to introduce intermediate sampling stages, i.e. administrative districts are sub-divided into wards, then polling districts.

## Area sampling

Area sampling is basically multistage sampling in which maps, rather than lists or registers, serve as the sampling frame. This is the main method of sampling in developing countries where adequate population lists are rare. The area to be covered is divided into a number of smaller sub-areas from

which a sample is selected at random within these areas; either a complete enumeration is taken or a further sub-sample.

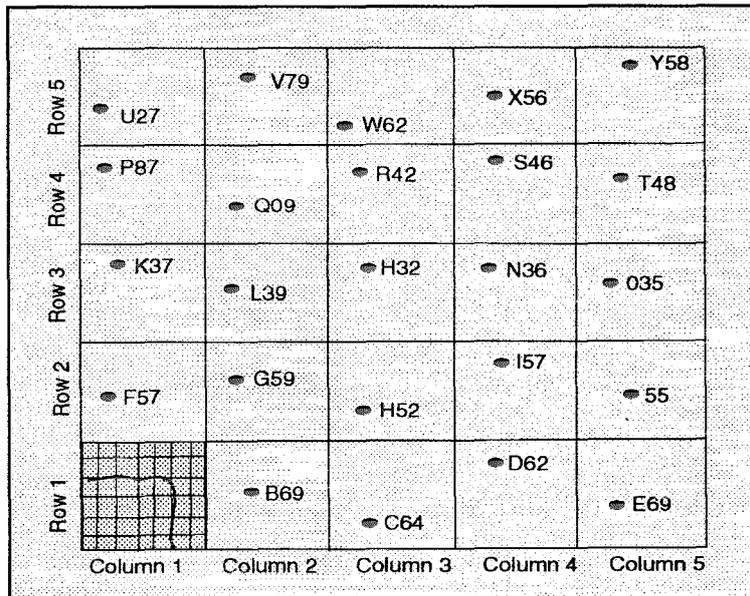


**Figure 7.3**  
Aerial sampling

A grid, such as that shown above, is drawn and superimposed on a map of the area of concern. Sampling points are selected on the basis of numbers drawn at random that equate to the numbered columns and rows of the grid.

If the area is large, it can be subdivided into sub-areas and a grid overlaid on these. Figure 7.4 depicts the procedures involved. As in figure 7.3 the columns and rows are given numbers. Then, each square in the grid is allocated numbers to define grid lines. Using random numbers, sampling points are chosen within each square. Figure 7.4 gives an impression of the pattern of sampling which emerges.

**Figure 7.4** Multistage aerial sampling



Suppose that a survey of agricultural machinery/implement ownership is to be made in a sample of rural households and that no comprehensive list of such dwellings is available to serve as a sampling frame. If there is an accurate map of the area we can superimpose vertical and horizontal lines on it, number these and use them as a reference grid. Using random numbers points can be placed on the map and data collected from households either on or nearest to those points. A variation is to divide the area into "parcels" of land. These "parcels" (the equivalent of city blocks) can be formed using natural boundaries e.g. hills or mountains, canals, rivers, railways, roads, etc. If sufficient information is known about an area then it is permissible to construct the "parcels" on the basis of agro-ecosystems.

Alternatively, if the survey is of urban households then clusters of dwellings such as blocks bounded by streets can be identified. This can serve as a convenient sampling frame. The town area is then divided into blocks and these blocks are numbered and a random sample of them is selected. The boundaries of the blocks must be well defined, easily identifiable by field workers and every dwelling must be clearly located in only one block. Streets, railway lines and rivers make good boundaries.

## Sampling and statistical testing

Research is conducted in order to determine the acceptability (or otherwise) of hypotheses. Having set up a hypothesis, we collect data which should yield direct information on the acceptability of that hypothesis. This empirical data requires to be organised in such a fashion as to make it meaningful. To this end, we organise it into frequency distributions and calculate averages or percentages. But often, these statistics on their own mean very little. The data we collect often requires to be compared and when comparisons have to be made, we must take into account the fact that our data is collected from a sample of the population and is subject to sampling and other errors. The remainder of this paper is concerned with the statistical testing of sample data. One assumption which is made is that the survey results are based on random probability samples.

## The null hypothesis

The first step in evaluating sample results is to set up a null hypothesis ( $H_0$ ). The null hypothesis is a hypothesis of no differences. We formulate it for the express purpose of rejecting it. It is formulated before we collect the data (a priori). For example, we may wish to know whether a particular promotional campaign has succeeded in increasing awareness amongst housewives of a certain brand of biscuit. Before the campaign we have a certain measure of awareness, say  $x\%$ . After the campaign we obtain another measure of the awareness, say  $y\%$ . The null hypothesis in this case would be that "there is no difference between the proportions aware of the brand, before and after the campaign".

Since we are dealing with sample results, we would expect some differences; and we must try and establish whether these differences are real (i.e. statistically significant) or whether they are due to random error or chance.

If the null hypothesis is rejected, then the alternative hypothesis may be accepted. The alternative hypothesis ( $H_1$ ) is a statement relating to the researchers' original hypothesis. Thus, in the above example, the alternative hypothesis could either be:

- a.  $H_1$  : There is a difference between the proportions of housewives aware of the brand, before and after the campaign.  
or
- b.  $H_1$  : There is an increase in the proportion of housewives aware of the brand, after the promotional campaign.

Note that these are clearly two different and distinct hypotheses. Case (a) does not indicate the direction of change and requires a TWO-TAILED test. Case (b), on the other hand, indicates the predicted direction of the difference and a one-tailed test is called for. The situation when a one-tailed test is used are:

- (a) comparing an experimental product with a currently marketed ones
- (b) comparing a cheaper product which will be marketed only if it is not inferior to a current product.

## Parametric tests and non-parametric tests

The next step is that of choosing the appropriate statistical test. There are basically two types of statistical test, parametric and non-parametric. Parametric tests are those which make assumptions about the nature of the population from which the scores were drawn (i.e. population values are "parameters", e.g. means and standard deviations). If we assume, for example, that the distribution of the sample means is normal, then we require to use a parametric test. Non-parametric tests do not require this type of assumption and relate mainly to that branch of statistics known as "order statistics". We discard actual numerical values and focus on the way in which things are ranked or classed. Thereafter, the choice between alternative types of test is determined by 3 factors: (1) whether we are working with dependent or independent samples, (2) whether we have more or less than two levels of the independent variable, and (3) the mathematical properties of the scale which we have used, i.e. ratio, interval, ordinal or nominal. (These issues are covered extensively in the data analysis course notes).

We will reject  $H_0$ , our null hypothesis, if a statistical test yields a value whose associated probability of occurrence is equal to or less than some small probability, known as the critical region (or level). Common values of this critical level are 0.05 and 0.01. Referring back to our example, if we had found that the observed difference between the percentage of housewives aware of the brand from pre-to-post-campaign could have arisen with probability 0.01 and if we had set our significance level in advance at 0.05, then we would accept the  $H_0$ . If, on the other hand, we found the probability of this difference occurring was 0.02 then we would reject the null hypothesis and accept our alternative hypothesis.

### Type I errors and type II errors

The choice of significance level affects the ratio of correct and incorrect conclusions which will be drawn. Given a significance level there are four alternatives to consider:

Correct Conclusion	Incorrect Conclusion
Accept a correct hypothesis	Reject a correct hypothesis
Reject an incorrect hypothesis	Accept an incorrect hypothesis

Figure 7.5 Type I and type II errors

Consider the following example. In a straightforward test of two products, we may decide to market product A if, and only if, 60% of the population prefer the product. Clearly we can set a sample size, so as to reject the null hypothesis of  $A = B = 50\%$  at, say, a 5% significance level. If we get a sample which yields 62% (and there will be 5 chances in a 100 that we get a figure greater than 60%) and the *null hypothesis* is in fact *true*, then we make what is known as a Type I error.

If however, the real population is  $A = 62\%$ , then we shall accept the null hypothesis  $A = 50\%$  on nearly half the occasions as shown in the diagram overleaf. In this situation we shall be saying "do not market A" when in fact there is a market for A. This is the type II error. We can of course increase the chance of making a type I error which will automatically decrease the chance of making a type II error.

Obviously some sort of compromise is required. This depends on the relative importance of the two types of error. If it is more important to avoid rejecting a true hypothesis (type I error) a high confidence coefficient (low value of  $\alpha$ ) will be used. If it is more important to avoid accepting a false hypothesis, a low confidence coefficient may be used. An analogy with the legal profession may help to clarify the matter. Under our system of law, a man is presumed innocent of murder until proved otherwise. Now, if a jury convicts a man when he is, in fact, innocent, a type I error will have been made: the jury has rejected the null hypothesis of innocence although it is actually true. If the jury absolves the man, when he is, in fact, guilty, a type II error will have been made: the jury has accepted the null hypothesis of innocence when the man is really guilty. Most people will agree that in this case, a type I error, convicting an innocent man, is the more serious.

In practice, of course, researchers rarely base their decisions on a single significance test. Significance tests may be applied to the answers to every question in a survey but the results will be only convincing, if consistent patterns emerge. For example, we may conduct a product test to find out consumers preferences. We do not usually base our conclusions on the results of one particular question, but we ask several, make statistical tests on the key questions and look for consistent significances. We must remember that when one makes a series of tests, some of the correct hypotheses will be rejected by chance. For example, if 20 questions were asked in our "before" and "after" survey and we test each question at the 5% level, then one of the differences is likely to give significant results, even if there is no real difference in the population.

No mention is made in these notes of considerations of costs of incorrect decisions. Statistical significance is not always the only criterion for basing action. Economic considerations of alternative actions is often just as important.

These, therefore, are the basic steps in the statistical testing procedure. The majority of tests are likely to be parametric tests where researchers assume some underlying distribution like the normal or binomial distribution. Researchers will obtain a result, say a difference between two means, calculate the standard error of the difference and then ask "How far away from the zero difference hypothesis is the difference we have found from our samples?"

To enable researchers to answer this question, they convert their actual difference into "standard errors" by dividing it by its standard deviation, then refer to a chart to ascertain the probability of such a difference occurring.

## Example calculations of sample size

1. Suppose a researcher wishes to measure a population with respect to the percentage of persons owning a maize sheller. He/she may have a rough idea of the likely percentage, and wishes the sample to be accurate to within 5% points and to be 95% confident of this accuracy.
2. Consider the standard error of a percentage :

$$SE(p) = \frac{\sqrt{(p)(q)}}{n}$$

Assume that the researcher hazards a guess that the likely percentage of ownership is 30%.

Then,

$$SE(p) = \frac{2\sqrt{(30)(70)}}{n}$$

But 2. [SE(p)] must equal 5% (the level of accuracy required)

i.e.  $5\% = \frac{2\sqrt{(30)(70)}}{n}$

$$25\% = \frac{4[(30)(70)]}{n} \text{ i.e. } n = \frac{4(30)(70)}{25} = \frac{8400}{25} = 336$$

It is necessary to take a sample of, say, 340 (rounding up).

Generally, then, for percentages, the sample size may be calculated using:

$$n = \frac{4(p)(q)}{(2SE)^2} \text{ for accuracy at the 95\% level.}$$

**Case 1:** In a census taken 6 years ago, 60% of farms were found to be selling horticultural produce direct to urban markets. Recently a sample survey has been carried out on 1000 farms and found 70% of them were selling their horticultural produce to urban centres direct.

**Situation:** Population statistics ( $P = 60\%$ ) are known

**Question:** Has there been a change in 6 years or is the higher percentage ( $p = 70\%$ ) found due to sampling error?

When the population value is known, we can know the sampling error and we use this error for the purpose of our statistical test. The standard error of a percentage is always  $pq/n$ , but in this case the researcher puts  $p$ , the population value, in the formula and uses the size of the sample,  $n$ , to ascertain the standard error of the estimate,  $p = 70\%$ .

The null hypothesis for this case is : "There is no difference between the sample percentage of farms selling direct to urban areas and the population percentage of farms found to be selling direct 6 years ago" (i.e. the sample we have drawn comes from the population on which the census was carried out and there has been no change in the 6 years).

This must be a 2-tailed test as it could not be assumed that there would either be more or less farms selling produce direct six years later.

$$\begin{aligned} \text{Standard error} &= \sqrt{\frac{PQ}{n}} \text{ PQ where } Q = 100 - P \\ &= \sqrt{\frac{60 \times 40}{1000}} \\ &= \sqrt{2.4} \\ &= \sqrt{1.55\%} \end{aligned}$$

Statistical test:

$$\begin{aligned} t &= \frac{p - q}{\sqrt{\frac{PQ}{n}}} = \frac{\text{Absolute difference}}{\text{Standard error of } p} \\ t &= \frac{60 - 70}{1.55} \text{ N.B. This has infinite degrees of freedom.} \\ &= \frac{10}{1.55} \\ t &= 6.45 \end{aligned}$$

If reference is made to the table for a two-tailed test with infinite degrees of freedom, it can be seen that  $t = 3.29$  which shows that there is only a 1/1000 chance of our result ( $p = 70\%$ ) being due to sampling error, since  $6.45 > 3.29$ . Researchers realise that the probability of this having occurred because of sampling error must be even smaller than 1/1000. Thus they are able to say that the probability that the percentage of households selling direct is now 70% is at least 999/1000 and that the null hypothesis is refuted at beyond 1/1000 level of significance. If researchers claim this, they shall be wrong less than 1 in 1000 times.

**Case 2:** Six months ago, it was found from a sample survey that 20% of shoppers in a certain urban area buy fresh fruit from street vendors rather than established shops or supermarkets. A second survey, independent of the earlier one, is carried out on 500 respondents and it is found that

24% of them buy fresh fruit and vegetables regularly from street vendors. Is there any real difference?

**Situation:** The two surveys are carried out on different occasions, so the two samples may well be subject to different amounts of error. Due to this researchers use both estimates of error.

**Question:** Has the percentage of gift shoppers changed?

**Null hypothesis:** There is no difference in the percentages of housewives buying from street vendors six months ago and now. This is a 2-tailed test.

Six months ago

$$P1 = 20\%$$

$$n1 = 200$$

$$S.E. (p1) = \sqrt{\frac{20 \times 80}{200}}$$

Now

$$P2 = 24\%$$

$$n2 = 500$$

$$S.E. (p2) = \sqrt{\frac{24 \times 76}{500}}$$

$$\text{Standard error of } P1 - P2 = \sqrt{\frac{p1 \cdot q1}{n1} + \frac{p2 \cdot q2}{n2}}$$

Since P1 is independent of P2

$$\begin{aligned} S.E. (p1 - p2) &= \sqrt{\frac{20 \times 80}{200} + \frac{24 \times 76}{500}} \\ &= \sqrt{8 + 3.648} \\ &= 3.3\% \end{aligned}$$

Test of significance

$$t = \frac{20 - 24}{3.3} = 1.18$$

N.B. This has infinite degrees of freedom.

Since  $1.18 < 1.64$ , the difference is not significant at even 1/10 (10%) level, so the null hypothesis is not refuted and researchers do not accept that there is any significant change in the percentage of women buying fresh fruit and vegetables from street vendors.

**Case 3:** 54% of rural housewives are found, in a sample of 200, to include fish in their family's weekly diet. However, in a sample of 100 urban housewives only 33% said that fish was a regular part of their diet.

**Situation:** The same commodity is being investigated on the same occasion by listing two parts of a population.

**Question:** Is there any difference between rural and urban housewives in their regular consumption of fish?

**Null hypothesis:** There is no difference between the two social class groups in their regular consumption of fish. This is a two-tailed test.

ABC

DE

$$\text{no.} = 33 = c1$$

$$\text{no.} = 108 = c2$$

$$P1 = 33\%$$

$$P2 = 54\%$$

$$n_1 = 100$$

$$n_2 = 200$$

$$\text{Standard error of } P_1 - P_2 = \sqrt{\frac{pq}{n_1} + \frac{pq}{n_2}}$$

$$\begin{aligned} \text{where } p &= \frac{c_1 + c_2}{n_1 + n_2} \times 100 = \frac{33 + 108}{300} \times 100 \\ &= \frac{141}{3} = 47\% \end{aligned}$$

N.B. Researchers take an average value of p, since they believe both the rural and urban families to be alike and the circumstances of measurement of p1 and p2 are exactly the same.

$$S.E. (p_1 - p_2) = \sqrt{\frac{47 \times 53}{100} + \frac{47 \times 53}{200}}$$

$$\begin{aligned} \text{So} \quad &= \sqrt{24.91 + 12.45} \\ &= \sqrt{37.36} \\ &= 6.1 \end{aligned}$$

Significant test

$$\begin{aligned} t &= \frac{p_1 - p_2}{S.E.(p_1 - p_2)} = \frac{33 - 54}{6.1} \\ &= \frac{21}{6.1} \\ t &= 3.44 \end{aligned}$$

(N.B. This has infinite degrees of freedom).

Since 3.44 > 3.29, the two-tailed t-value for 1/1000 level of significance for 0 degrees of freedom, the null hypothesis is refuted at beyond the 1/1000 level. Thus the difference in fish consumption between rural and urban housewives is significant at beyond 1/1000 level.

**Case 4:** 200 housewives are interviewed in June to determine their purchases of a canned fruit juice. Two months later, after an intensive promotional campaign, they are re-interviewed with the same object.

**Situation:** The same sample is interviewed on two different occasions (or assessing two different products).

**Question:** Is there any difference in purchases of the product between June and September?

**Null hypothesis:** There is no difference in purchases of the product between June and September (A two-tailed test).

	June	September	
Purchases %	20	32	Sample size = n = 200

$$S.E.(p_j - p_s) = \sqrt{\frac{p_j q_j}{n} + \frac{p_s q_s}{n} - \frac{2 p_j p_s}{n}}$$

The last term under the square root sign = 2 x Covariance of the two assessments, the term which takes into consideration how each person behaves both in June and September.

$$\begin{aligned}
 S.E (p_j - p_s) &= \sqrt{\frac{20 \times 80}{200} + \frac{32 \times 68}{200} - \frac{2 \times 20 \times 32}{200}} \\
 &= \sqrt{\frac{1600 + 2176 - 1280}{200}} \\
 &= 3.54
 \end{aligned}$$

Significance test

$$t = \frac{20 - 32}{3.54} = 3.39$$

This has infinite degrees of freedom.

Since  $3.39 > 3.29$  with 0.0 degrees of freedom, the difference between the June and September purchases is significant at beyond the 1/1000 or 0.1% level, (i.e. the null hypothesis is refuted at this level).

### Confidence intervals for the mean

Sometimes the task is one of estimating a population value from a sample mean, rather than testing hypotheses. For example, suppose from a sample of 100 farmers it is found that their average monthly purchases of the Insecticide Bugdeath were 10.5 litres. It cannot assume that simply because the sample mean was 10.5 litres that this is necessarily a good estimate of the average purchases of all farmers in the population. Indeed, samples do not and cannot give point estimates, like 10.5 litres. Rather a sample will give a range within which it is thought the true population value lies. To calculate this range researchers need to know the standard deviation as well as the mean. The standard deviation is calculated as follows:

Suppose a small sample of say 8 farmers is taken and asked how much Bugdeath they bought each month. Their responses appear in table 7.1 below. Their mean consumption is 10.5 litres per month. In the middle column you will see that researchers have subtracted each of the individual values from the mean. In the end column these values have been squared and summed to give the total variance.

X Consumption in litres	$\bar{X} - X$	$(\bar{X} - X)^2$
5	-5.5	30.25
8	-2.5	6.25
8	-2.5	6.25
11	0.5	0.25
11	0.5	0.25
11	0.5	0.25
14	3.5	12.25
16	5.5	30.25
X = 10.5	Total variance = 86.00	

**Table 7.1 Calculating the mean and standard deviation**

To calculate the standard deviation researchers divide the total variance by the sample size to obtain the standard deviation i.e.  $86 \div 8 = 10.75 \therefore \sqrt{10.75} = 3.3$

From the standard deviation researchers must now calculate the standard error if they are to project from what are sample figures to the population. The standard error is calculated by dividing the standard deviation by the square root of the sample size, viz:

$$\sqrt{\frac{3.3}{8}} = 2.83$$

Thus the estimate is that the average consumption is 10.5 litres plus or minus 2.83 litres, i.e., it is estimated that most farmers buy somewhere between 7.67 litres and 13.33 litres. This is the best estimate that can be given on the basis of such a small sample.

As those who have studied elementary statistics will know, only 68% of the values under a normal distribution curve lie between  $\pm 1$  standard deviation. In other words, researchers can only be 68% sure that the true consumption level is between 7.67 and 13.33 litres. If researchers want to be 95% sure of a correct prediction then they must multiply their standard error by 1.96. (Students may have to be reminded that if they look up their statistical tables they will see that 95% of the area under the curve equates to a Z value of 1.96.)

Thus, the calculation becomes:

$$\begin{aligned} &= \bar{X} \pm Z (\text{Standard Error}) \\ \text{Confidence Interval} &= 10.5 \pm 1.96 \times 2.83 \\ &= 10.5 \pm 5.5 \\ &= 5 \text{ to } 17 \text{ litres} \end{aligned}$$

So, researchers are 95% confident that the true value of farmers' usage of Bugdeath is between 5 and 17 litres. This example serves to show the mechanics of the confidence interval calculation and the poor estimates we get from small sample sizes.

Students who have had a basic training in statistics will also know that if they wanted to be 99% confident then the Z value would be 2.57 rather than 1.96.

## Chapter Summary

Two major principles underlie all sample design: the desire to avoid bias in the selection procedure and to achieve the maximum precision for a given outlay of resources. Sampling bias arises when selection is consciously or unconsciously influenced by human choice, the sampling frame inadequately covers the target population or some sections of the population cannot be found or refuse to co-operate.

Random, or probability sampling, gives each member of the target population a known and equal probability of selection. Systematic sampling is a modification of random sampling. To arrive at a systematic sample we simply calculate the desired sampling fraction and take every  $n$ th case.

Stratification increases precision without increasing sample size. There is no departure from the principles of randomness. It merely denotes that before any selection takes place, the population is divided into a number of strata, then a random sample is taken within each stratum. It is only possible to stratify if the distribution of the population with respect to a particular factor is known, and if it is also known to which stratum each member of the population belongs. Random stratified sampling is more precise and more convenient than simple random sampling. Stratification has the effect of removing differences between stratum means from the sampling error. The best basis would be the frequency distribution of the principal variable being studied. Some practical problems limit the desirability of a large number of strata: (1) past a certain point, the "residual" variation will dominate, and little improvement will be effected by creating more strata (2) a point may be reached where creation of additional strata is economically unproductive. Sample sizes within strata are determined either on a proportional allocation or optimum allocation basis.

Quota sampling is a method of stratified sampling in which the selection within strata is non-random. Therefore, it is not possible to estimate sampling errors. Some argue that sampling errors are so small compared with all the other errors and biases that not being able to estimate standard errors is no great disadvantage. The interviewer may fail to secure a representative sample of respondents in quota sampling, e.g. are those in the over 65 age group spread over all the age range or clustered around 65 and 66? Social class controls leave a lot to the interviewer's judgments. Strict control of fieldwork is more difficult, i.e. did interviewers place respondents in groups where cases are needed rather than in those to which they belong.

A quota interview on average costs only half or a third as much as a random interview, the labour of random selection is avoided, and so are the headaches of non-contact and call-backs, and if fieldwork

has to be quick, perhaps to reduce memory errors, quota sampling may be the only possibility. Quota sampling is independent of the existence of sampling frames.

The process of sampling complete groups or units is called cluster sampling. Where there is sub-sampling within the clusters chosen at the first stage, the term multistage sampling applies. The population is regarded as being composed of a number of first stage or primary sampling units (PSU's) each of them being made up of a number of second stage units in each selected PSU and so the procedure continues down to the final sampling unit, with the sampling ideally being random at each stage. Using cluster samples ensures fieldwork is materially simplified and made cheaper. That is, cluster sampling tends to offer greater reliability for a given cost rather than greater reliability for a given sample size. With respect to statistical efficiency, larger numbers of small clusters is better - all other things being equal - than a small number of large clusters.

Multistage sampling involves first selecting the PSU, then the final sampling units such as individuals, households or addresses.

Area sampling is basically multistage sampling in which maps, rather than lists or registers, serve as the sampling frame. This is the main method of sampling in developing countries where adequate population lists are rare.

## Key Terms

Area sampling	Null hypothesis	Sample mean
Cluster sampling	Parametric tests	Significance test
Confidence intervals	Proportional allocation	Standard errors
Degrees of freedom	Quota sampling	Stratified samples
Multistage sampling	Random number	Systematic sampling
Non-parametric tests	Random sampling	Type I errors and type II errors

## Review Questions

1. Define the term 'random sampling'
2. Name the 3 non-probability sampling methods shown in the opening section of the chapter.
3. What are the 3 key questions to be posed when employing stratified sampling?
4. Explain the term 'proportional allocation'.
5. Outline the arguments against quota sampling.
6. Explain the term 'primary sampling units 'PSUs'
7. Define the term 'null hypothesis'.
8. What are the 2 types of statistical tests?
9. Explain the meaning of a 'type I error'.
10. Which Z value equates to a 95% confidence level?

## Chapter References

1. Crawford, I. M. (1990), *Marketing Research*, Centre and Network for Agricultural Marketing Training in Eastern and Southern Africa, Harare, pp 36-48.

# Rapid Rural Appraisal

## Chapter

## 8

Rapid Rural Appraisal (RRA) methodology owes much of its early development to Farming Systems Research and Extension as promoted by the Consultative Group on International Agricultural Research Centers (CGIAR). RRA was developed in response to the disadvantages of more traditional research methods, including: the time taken to produce results, the high cost of formal surveys and the low levels of data reliability due to non-sampling errors. RRA is a bridge between formal surveys and unstructured research methods such as depth interviews, focus groups and observation studies. In developing countries, it is sometimes difficult to apply the standard marketing research techniques employed elsewhere. There is often a paucity of baseline data, poor facilities for marketing research (e.g. no sampling frames, relatively low literacy among many populations of interest and few trained enumerators) as well as the lack of appreciation of the need for marketing research. The nature of RRA is such that it holds the promise of overcoming these and other limitations of marketing research.

### Chapter Objectives

- To explain the concept of Rapid Rural Appraisal
- To describe the principal tools and techniques of Rapid Rural Appraisal
- To highlight the strengths and weaknesses of Rapid Rural Appraisal in the context of marketing research studies
- To identify the potential applications of Rapid Rural Appraisal in marketing research studies, and
- To outline the principles which should be applied in order to ensure the effective application of RRA.

### Structure Of The Chapter

First, an attempt is made to define Rapid Rural Appraisal (RRA) and to define the tools upon which the approach depends. The origins of RRA, in Farm Systems Research, are explained and then the principal tools of this research methodology are listed. Definitions and descriptions of RRA are explained before typical applications and potential applications are described. The chapter goes on to discuss the relative advantages of RRA relative to other methods and techniques, and its distinctive characteristics are identified. This is followed by an overview of the principles of RRA as applied within marketing. The final section of the chapter outlines the important contents and preferred orientation of the report of a rapid rural marketing appraisal study.

## RRA definition

Unfortunately, there is no generally accepted definition of RRA. RRA is more commonly described as a systematic but semi-structured activity out in the field by a multidisciplinary team and is designed to obtain new information and to formulate new hypotheses about rural life. A central characteristic of RRA is that its research teams are multidisciplinary.

Beyond that, the distinction between RRA and other research methodologies depends upon its multidisciplinary approach and the particular combination of tools that it employs. A core concept of RRA is that research should be carried out not by individuals, but by a team comprised of members drawn from a variety of appropriate disciplines. Such teams are intended to be comprised of some members with relevant technical backgrounds and others with social science skills, including marketing research skills. In this way, it is thought that the varying perspectives of RRA research team members will provide a more balanced picture. The techniques of RRA include:

- interview and question design techniques for individual, household and key informant interviews
- methods of cross-checking information from different sources
- sampling techniques that can be adapted to a particular objective
- methods of obtaining quantitative data in a short time frame
- group interview techniques, including focus-group interviewing
- methods of direct observation at site level, and
- use of secondary data sources.

McCracken et al<sup>1</sup> describe, rather than define, RRA as an approach for conducting action-oriented research in developing countries.

Ellman<sup>2</sup> offers a good example to compare the "traditional" rural development research to RRA. He was requested to analyse the achievements of four types of land settlement schemes in Sri Lanka and to recommend a policy for future settlement in one million acres of cultivable land. He was advised, by a statistician, to sample 20% of the settlements in operation. This meant 80 settlements and two and a half years of field survey were carried out by two experienced researchers. Finally, he and his colleague, helped by two assistants, conducted "full social, economic and attitudinal surveys" with a sample of 20 settlements. Nine months were needed to collect the data, and six months to write it up. The result: a two-volume report of 305 pages. By the time the message (Ellman says "quite a simple one") was absorbed by those who needed to know it, the government had changed and suddenly the study had lost much of its relevance. With the idea of RRA in mind, he is "convinced that the same message could have been put across more quickly, cheaply and effectively, with evidence drawn from a smaller, purposively selected and studied sample and with no significant reduction in reliability".

Ellman was later commissioned to carry out another study, and having learnt from that earlier experience, he identified the minimum amount of data that was required and was likely to be effectively used for planning purposes. A team of ten people collected data in six weeks, and produced a 25-page report with clear recommendations, which were broadly accepted by the government and the international agency. The project, concerning integrated rural development, was finally implemented.

The application of RRA has been quite wide as regards rural development, for example in health, nutrition, emergencies and disasters, non-formal education, agroforestry, natural resource assessment and sociology approaches. RRA has also been applied in agricultural marketing, although the marketing orientation of RRA studies has not been very well defined.

Thus the term rapid appraisal does not refer to a single technique but to a range of investigation procedures. Their chief characteristics are that they take only a short time to complete, tend to be relatively cheap to carry out and make use of more 'informal' data collection procedures. The techniques rely primarily on expert observation coupled with semi-structured interviewing of farmers, local leaders and officials. In substance the techniques of RRA have much in common with the social anthropologist's case study approach but are executed over a period of weeks, or at most months, rather than extending over several years. To date RRA has mainly been used in the field of rural

development as a short cut method to be employed at the feasibility stage of project planning.

RRA is also useful for supporting decisions towards the improvement of agricultural marketing systems in developing countries. The role that Rapid Rural Marketing Appraisal (RRMA) can play in this broad sense of marketing research lies in the identification and prioritisation of marketing problems, and the evaluation of practical means of improving marketing functions, to meet the needs for expansion coupled with higher performance. The first step is to describe accurately and meaningfully the systems that exist. The next step is the evaluation of structures and performance, and the major forces responsible for changing their relationships. In a broader scope, research must analyse the changing strategic role of marketing in the development process.

A checklist of some general and more specific research activities and topics is suggested in the following, where RRMA seems to be a suitable approach:

- Description, problems of assessment and evaluation of marketing systems for design of improvement projects in production, storage, handling, processing, transportation and distribution, as well as wholesaling and retailing, analysing alternatives
- Analysis of marketing feasibility and social acceptability of performance improvements. Prediction of effects on conduct and structure, as well as social effects
- Monitoring and evaluation of marketing activities
- Design and selection of topics to conduct further or other types of research or trials
- Rural communications design for interventions in nutrition, technology adoption, health, housing, standard of living, education, etc.
- Extension techniques assessment for training and technical assistance
- Design of participatory schemes, like farmer-managed marketing enterprises supported by a development or governmental agency
- Rural organisations assessment
- Understanding of resources use and dependency patterns of local communities
- Design of strategies for reduction of losses and deterioration in quality, and quality improvement of agricultural products
- Design of strategies for reduction in production and marketing activities costs
- Understanding and improvement of price efficiencies
- Evaluation of proposed changes in agricultural marketing systems, in terms of objectives of an efficiency for producers, consumers and intermediaries
- Measurement of performance of the "macro" level in marketing systems, in terms of development goals, such as improvement in nutritional status, proportion of the income spent on food, or increased rural income and standard of living
- Managerial, technical and marketing expertise necessity assessment
- Identification and analysis of existing and potential markets for new food products and processes
- Understanding of the technical, social, and economic constraints of traditional farming systems to define research that will lead to changes of benefit to the farmer
- Development of projects, products and processes having an ex-ante market evaluation
- Facilitation of the commercialisation of socially desirable food products
- Development of pricing, promotion and distribution techniques, using profitability and economic criteria

- Analysis of farmers' perception of farm household risk and uncertainty over practices of production, storage, and distribution, perception of price incentives and other stimuli
- Evaluation of systems using a global perspective: economic requirements of the system, appropriate social values, the interacting institutions, and the flow of final results.

Rapid rural appraisal is a set of techniques that can be applied as a preliminary stage when embarking on surveys of farmers. The technique essentially involves an informal, rapid, exploratory study of a specified geographical area designed to establish an 'understanding' of local agricultural conditions, problems and characteristics. They can provide basic information on the feasibility of beginning a survey project in an area, particularly when one is intending to survey an area about which little is known.

RRMA is also a suitable approach in the commercial sense of marketing and not merely social, that is the research of consumer needs and wants from the viewpoint which looks at rural people as a target market. As in the case of social marketing, the application of RRMA will depend on particular circumstances and research objectives. Some research topics, both general and more particular, to carry out RRMA research having rural communities as target markets are suggested in the following:

- Identification of the needs of communities in rural areas, and of the future direction and strategy of food technology research to satisfy those needs
- Study of the market to discover a target market or a market segment for which producers might develop a product
- To test that a project is "on track", that is according to the wants and needs of the consumer or the end-user
- Appropriate technology design; suitability, acceptability, adoption patterns and impact evaluation of technology changes

Identification of intensity and variety of forms taken by consumers' demands

- Identification of demographic and psychographic characteristics and constraints on consumer behaviour that determine and affect the market performance, e.g. economic status, income, life style, consumption habits
- Knowledge of what consumers would like to do, and what they are able to do
- Identification of stratification criteria within rural communities for market segmentation strategies
- Study of rural people's attitudes and cultural characteristics towards nutritional improvements, selection of target groups and development of product to be supplemented, and selection or design of the delivery system
- Study of individual and organisational decision-making processes concerning purchasing and consumption patterns; leadership impact
- Study of consumer needs by analysing attitudes, motivation, and behaviour, e.g. risk perception, price perception, brand differentiation and consumer's knowledge of the quality and range of goods and services
- Development and selection of product concepts, products testing, experimentation on developing the prototype product, specification of production process and products
- Definition of research priorities, determination of variables to analyse, setting up experimentation criteria, definition of hypotheses
- Design, evaluation and monitoring of nutrition programmes
- Development of advertising strategies: definition, development and testing, and monitoring and evaluation; audience considerations, valuation of performance and effectiveness, support for response measurement

- Development of total propositions for rural requirements: product, packaging, positioning and advertising
- Design of packaging for rural conditions: functional considerations, appeal at the wholesaling and retailer level, packaging screening tests, effect evaluation
- Corporate image research for firms and institutions working in rural communities.

RRMA can be used to quickly obtain basic information specifically to aid the generation of hypotheses and the design of questions for a questionnaire. In particular information can be gathered relating to:

- farming system characteristics (e.g. farm sizes and types)
- farmers' decision-making processes (e.g. how decisions are made concerning the purchase of new equipment, and the criteria considered important)
- issues of concern to farmers (e.g. their major farming problems)
- farmers' equipment ownership (e.g. which type of farmers own which type of equipment, and where they are located).

With a rapid rural appraisal the researcher acts like an explorer, making a brief survey of the horizon before plunging into the depths of the research from which the wider view is no longer possible. If the researcher observes keenly at the start, the remainder of the survey process stands a better chance of success and time will not be wasted. Without a rapid rural appraisal a researcher may find himself surveying the wrong area, collecting the wrong type of information, asking the wrong people, and precious time and funds can be lost back-tracking.

The appraisal can produce, at a minimum cost, a rich description of life in the farming community and an understanding of local agricultural characteristics that will be invaluable in ensuring that the right areas and people are surveyed and that appropriate questions are asked.

## Differences between rapid rural appraisal and other approaches

Chambers<sup>3</sup> describes the orientation of RRA as a "fairly-quick and-fairly-clean" appraisal, and as opposed to the fast and careless studies (he calls them "quick-and-dirty" studies) and the slow and excessively accurate approaches ("long-and-dirty").

On the one hand, the most common form of fast, rough studies - the "quick-and-dirty" approach - is termed rural development tourism, that is the brief rural visit by the urban based "expert". Although Chambers says that it can be cost-effective for the outstanding individual, it is important to be clear that it can be actually low-cost research, but of course not cost-effective. This practitioner, as opposed to the formal academic, wants quick insights and quick results. "Brief rural visits, snatches of information here and there and a few observations, anecdotes and impressions are put together as the basis for time-bound judgements and decisions". Commonly rural development tourism means highly biased results, especially concerning anti-poverty biases. In other words, it has large misperceptions and misinterpretations of the rural reality, and not only due to lack of time to carry out a deeper research.

Chambers cites the main biases of rural development tourism as being: spatial (urban-tarmac-and-roadside biases, that is going only to easily accessible places), project (neglecting non-project areas), personal contact (meeting the less poor and more powerful rural people, men rather than women, users of services rather than non-users, and so on), dry season (travelling in the post-harvest or post-rainy season, when it is easier) and politeness-and-protocol bias (lack of courtesy and convention, lack of adaptation to local conditions, shortage of time, etc.).

On the other hand, formal and accurate studies - the "long-and-dirty" ones Chambers goes on to describe - are longer and more costly solutions preferred by "well-trained" professionals. They are preferred by the academic community, interested more in detail, precise observation and measurement and rigorous and respectable methodology and with a generally rather unhurried concern for knowledge for its own sake in the longer term. Formal studies do not generate information in the early stages, and some, though not all of them, are academically excellent but finally useless, very likely because of the lack of opportunity to induce the desired effects or results. Many are never used: never coded, punched, processed, printed out, examined, written up, read, understood or

known to actually change action. Moreover, many studies rarely communicate the knowledge gained; researchers write in a way that makes it unavailable or unintelligible to bureaucrats in the formal planning system. Chambers<sup>3</sup> says "... rural surveys must be one of the most inefficient industries in the world ...; the longer the research takes, the longer and less usable the report tends to be and the greater the time available for sweeping the dirt under the carpet". The biggest single blockage is the failure to "treat statistics as servant rather than master". Cases to illustrate the fact can be seen all over the world: papers that, if finally written, are too late to induce the change desired (for instance, the case already described in Ellman's<sup>2</sup> experience). McCracken et al.<sup>1</sup> summarised the main arguments against inefficient formal (traditional) studies demonstrating that these conventional methods have a long duration, fixed and formal structure, limited scope, weak integration, exhaustive depth, "top-down" direction, low integration with local farmers, high cost and inefficient use of time and manpower.

As stated earlier, the point is to determine which information is really relevant, opportune, understandable and actually useful for the decision makers: the middle zone (between both extremes, the short-and-inaccurate and the long-and-excessively-accurate) of greater cost-effectiveness. The task is obviously not easy and requires experience, knowledge, and perhaps, as it has been even suggested to define RRA, a lot of "common sense". It is therefore important to realise that RRA procedures are more and not less demanding of expertise, when compared to the "dirty-short" and "dirty-long" approaches. Optimal ignorance can only be achieved if investigators are both well informed and sensitive to what they may not know.

## Team composition

One of the main characteristics of RRA is to work with a multidisciplinary team. The advantages have been already discussed. Chambers<sup>3</sup> is emphatic in pointing out that the argument that it is necessary to have an integrated and coordinated approach to research cannot be used as an argument for having only one well-informed and intelligent person to do it all. Moreover, Beebe<sup>4</sup> proposes not using the term Rapid Appraisal to describe studies done by one person.

The question remaining is, "which disciplines have to participate?" The point does not seem to be very critical, since for example Shanner<sup>5</sup> et al. think that the disciplinary speciality of team members is not critical as long as "several" disciplines are represented. For agricultural marketing purposes, and of course depending on the objectives of the research, the best solution seems to be to have at least a team of two researchers, one with natural-sciences background (agriculture and related disciplines), and another with social-sciences background (e.g. economist, sociologist), but both with marketing knowledge. This background of course is not definitive, yet the recommendation is still to have at least two researchers. The particular skills of researchers are discussed in the next chapter.

The recommendation is to recruit both men and women to be included on the research team, to overcome the difficulties and take advantage of the situations associated with researcher gender, as well as to provide possible different insights.

Another recommendation is for researchers to have "some" familiarity with aspects of the systems being investigated. Teams should be composed of a mix of insiders and outsiders. Insiders or people very familiar with the area will provide a high-knowledge perspective to the problem. The outsider's participation may be extremely valuable to the insiders in identifying possible options and in noting constraints that might otherwise be overlooked. Outsiders also can gain insights and knowledge that can guide their research activities away from the farm. These considerations are in addition to the points discussed above concerning participation of farmers themselves.

To carry out research with real interaction and participation of all members of the team it is recommended to work with smaller teams rather than larger teams; a ten-member team is probably too large. For example, large teams working in the same interview simultaneously can intimidate rural people.

Opinions differ on how to structure the time of RRMA, but there is almost universal agreement on the importance of dividing time between collecting data and team interactions to make sense out of the collected data<sup>4</sup>. Interactions between researchers at the end of each day and at the end of the field work seem to be essential in determining the success of the RRMA. Scheduling RRMA time can ensure that time for group interaction will be adequate and that a variety of different activities can be covered in a short period of time. As an initial phase, that is even before deciding on how to structure the plan, it is necessary to decide on whether to invest in a preliminary visit by one or two members of the team, expecting them to explain the forthcoming research, find a place to work (for the team

sessions), arrange vehicles, identify local participants, request for information, and so on.

The rapid rural appraisal technique is straight - forward to administer but can be physically demanding. It cannot be accomplished simply by driving along a main road looking at fields (although such a method may be a way to begin). The successful appraisal may require tracking over fields in high temperatures and/or over difficult terrain. Researchers must be prepared to collect information in the fields, market places, or wherever farmers' daily routines take them.

The rapid rural appraisal requires mental and methodological flexibility. It does not proceed like the 'formal questionnaire survey' where predetermined hypotheses are tested. Instead, important questions, issues and the direction of the study emerge as information is collected. This is not to say that the informal survey lacks logic, but that one must be able to accommodate new information and adjust research plans accordingly.

## **The principles of rapid rural appraisals**

The following are the principles of RRA agreed by its practitioners, in spite of the fact that there are different opinions and criteria concerning them. These are general principles of theory:

1. **Optimising trade-offs:** relating the costs of learning to the useful truth of information, having trade-offs between quantity, relevance, accuracy and timeliness of the information acquired, as well as its actual use. Trade-offs in this sense are not merely mathematical ratios, but they also entail, in the context of cost-effectiveness, alertness, observation, imagination and the ability to pursue serendipity.
2. **Offsetting biases:** through introspection, it is necessary to identify cognitive biases and deliberately offset those biases. The recommendations are: to be relaxed and not rushed; listening not lecturing; probing instead of passing onto the next topic; being unimposing instead of imposing; and seeking out the poorer people and what concerns them.
3. **Triangulating:** using more than one technique/source of information to cross-check answers, that is comparing and complementing information from different sources or gathered in different ways. It also involves having team - multidisciplinary - members with the ability to approach the same piece of information or the same question from different perspectives.
4. **Learning from and with the rural people:** this means learning directly, on-site, and face-to-face, gaining from indigenous physical, technical, and social knowledge. Farmers' perceptions and understanding of resource situations and problems are important to learn and comprehend because solutions must be viable and acceptable in the local context, and because local inhabitants possess extensive knowledge about their resource setting.
5. **Learning rapidly and progressively:** this means the process of learning with conscious exploration, flexible use of methods, opportunism, improvisation, iteration, and cross-checking, not following a blueprint programme but adapting through the learning process. However, this could sound again as a non-systematic way of carrying out research.

A fundamental principle is the making of contact with the rural population in a learning process. This aspect must be one of the focal points.

## **Agricultural issues worth investigation through appraisals**

Before embarking on any appraisal, the research team needs to decide what type of information is needed. The specific objectives of the appraisal should be very clear and a list of important topics for investigation should be drawn up.

In conducting surveys of farmers to establish either demand for, or the acceptability of, new equipment types, the researchers should be looking for information concerning agricultural, farm power and socio-economic issues. Information should be collected on any related issues in these

areas that might affect interest in the equipment being considered. Examples of the types of information that might be collected are outlined below:

### **Agricultural issues : for RRA**

- Main crops grown (by season)
- Land use intensity
- Extent of inter-cropping
- Soil types and soil conditions (degree of salinity, water-logging)
- Farm sizes areas owned and areas cultivated
- Extent of farm fragmentation; size of individual plots, average number of plots owned, and distances from farmstead
- Ground topography: upland/lowland; land slope, field characteristics (average size, obstacles for efficient use of machinery)
- Irrigation supply canal, rainfed, tubewell, time, day and duration of water received
- Crop yields
- Agricultural practices: methods used and timing for:
  - Land preparation
  - Planting, sowing, transplantation
  - Fertilizer application
  - Weeding
  - Irrigation, drainage
  - Harvesting
  - Crop processing
  - Transportation

### **Farm power issues : for RRA**

- Inventory/ownership of equipment (tractors, implements, tools)
- Use of different power sources for each operation (mechanised, animal or hand)
- Problems experienced in conducting different operations (e.g. labour supply, cost, crop quality, conditions)
- Use of hiring/contracting services for different operations (reasons)
- Labour utilisation type (family, hired), labour cost and availability
- Sources of funds used to purchase machines/equipment in past
- Machine requirement priorities

### **Socio-economic issues : for RRA**

- Land tenure systems : tenants, owners, owners-cum-tenants
- Decision making units; extent and influence of social networks on machine/implement/tool purchasing
- Farm incomes : sources and amount

- Availability of resources: sources of funds if required (personal, friends, relatives, agricultural banks, money lenders)
- Age and level of education.

## Field operation principles

Armed with tentative questions and information objectives, field research can begin. At first everything may seem confusing in the field. However, before long the region will become understandable if researchers follow three simple principles of fieldwork :

- Observe :** Researchers should keenly watch for patterns of crop production, land use, and farm/farmer behaviour.
- Converse :** Researchers should stop and talk to farmers and listen to their concerns and views.
- Record :** Researchers should write everything down. Complete field-notes are crucial. This is especially essential in the early stages of the appraisal to help organise thinking.

If a large region is to be studied in the rural appraisal and a large research team is to be employed, it is advisable to carefully divide the region into smaller areas and appoint small teams (of 2 or 3 researchers) to cover each area. Specific delineation of the boundaries of each area must be made to ensure that no overlap occurs between teams.

A secondary data review should be conducted before conducting the research in the field. This would involve searching for and studying existing reports and records, and not only published data. Relevant information can be found in government agencies, universities, research centres, marketing bodies and other institutions. Relevant information can be project documents, research papers, annual reports, previous survey results, maps, as well as journals and books and even newspapers.

## Field techniques : Mapping agricultural data

A convenient way to systematically and accurately record basic agricultural data is to develop agricultural maps of the area whilst in the field, a technique often referred to as 'field plotting'. Field characteristics such as crop types, field sizes, irrigation methods, soil conditions, and so on are identified and base maps are then annotated to illustrate the location and extent of each of the characteristics observed.

**Preparation of base maps:** The first step is to prepare an outline of the area to be studied. Any available maps of the district should be consulted in the preparations, and the final base map should feature :

- Major and minor communication routes
- Major and minor settlements (towns and villages)
- Major geographical/topographical features (e.g. irrigation canals) which may assist researchers in the field to identify their exact location in relation to the map
- Major roads
- Minor roads
- Water ways
- Villages/minor settlements; land use
- Field mapping of land use.

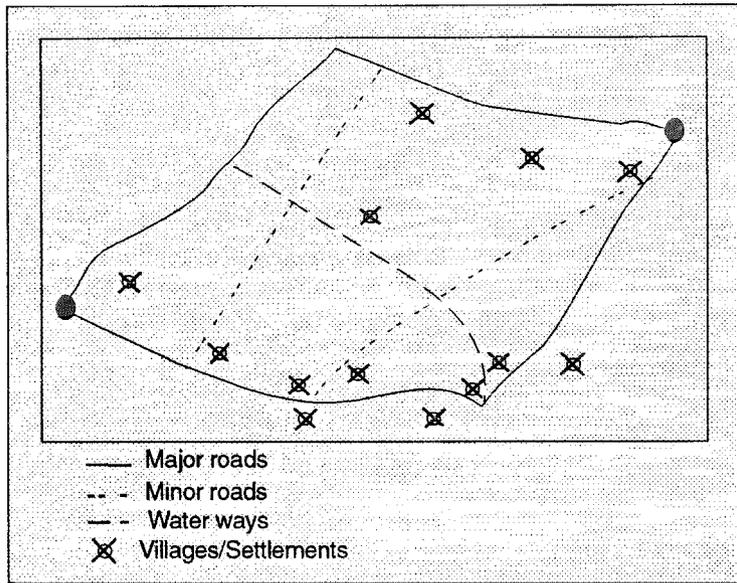
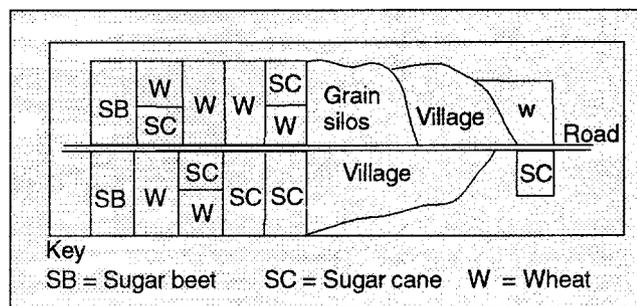


Figure 8.1 A rapid rural appraisal base map

One systematic means of ensuring that mapping of land use is evenly spread throughout an area is to record/map the land use which is observed whilst driving along the roads identified on the map. This technique is called a 'windshield survey' and can be conducted in two forms.

**Continuous recording:** All land use within 100 metres of either side of the road (or one side if the road is on the area boundary) is recorded on the base map.

Figure 8.2 Continuous recording



Mapping in this way can give a very accurate reflection of land use types in a region, but it can be very time-consuming.

**Systematic step recording:** The alternative method is to record the land use at 'set intervals' along the routes, for example every 1 or 2 km.

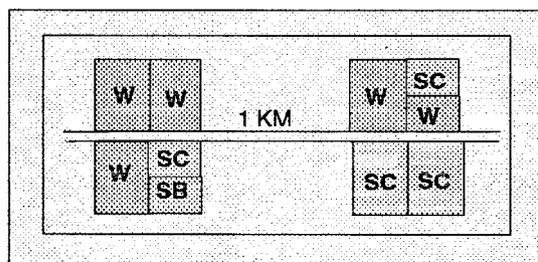
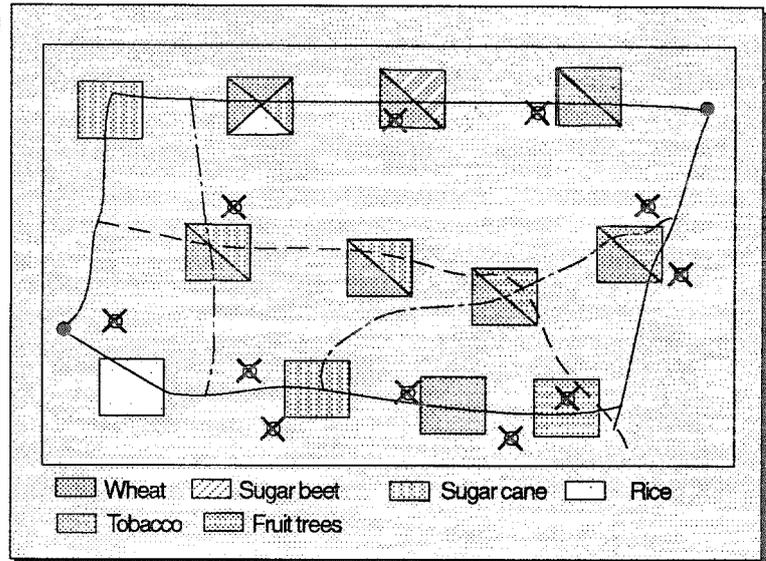


Figure 8.3 Systematic step recording

The advantage here is that the mapping process can be completed in a relatively short time, and provided strictly systematic methods are employed a good representation of land use in the area can be obtained.

The ultimate objective here is to produce a map which shows the major land-use types in the area, and colours can be used to improve visual recognition. The map can be further developed by recording (with the use of symbols/colours/notes) other characteristics of farming in the area.

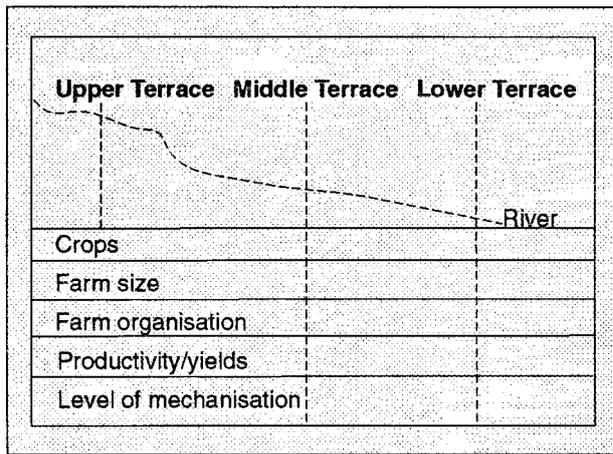
**Figure 8.4 RRA base map using systematic step recording**



If strict systematic procedures have been followed and the field research has recorded the proportion of different crop types within the 50m area either side of the roads, then it is possible to use this data to calculate approximately the total proportions of different land use in the area. This is achieved by summing the frequency and proportions of each land use type and calculating its percentage share of total land use area.

**Recording agricultural data by transects:** In certain areas of the region being studied it may be appropriate to record data along 'transects' rather than along communication routes. Roads tend to follow contours and thus land use in an area which includes wide variations in land height may be poorly represented if route-mapping is used. A route-mapping exercise in such an area as this would not record potentially marked differences in land use which may be present at different land heights within the area not traversed by roads.

In such situations 'transect' mapping can be employed where land-use is plotted at different land levels (on foot or by eye in rough terrain areas). A transect map might appear as follows:



**Figure 8.5 Recording data by transect**

It should be borne in mind that land use mapping and field observations are 'time-frozen' that is they show the agricultural situation at only one specific period in time. To gain a fuller understanding of local agriculture, particularly in respect of seasonal changes in land-use (rotations) and expected future crops, interviews with individuals from within the local community concerned are essential as part of the rapid rural appraisal.

Aerial photographs can be useful too. These are useful in the planning of field research, to identify settlements, for the evaluation of the availability of natural resources, crop-patterns, land-use and physical evidence of land-holding, and the assessment of the existence, distribution and conditions of roads within a defined area of interest.

## Field techniques:

The key to a successful informal survey, especially in relation to understanding farmers' problems, is a few successful interviews.

Due to the nature of informal surveys it is not essential to select farmers at random using sophisticated random sampling techniques. It is certainly advisable to ensure that interviews are conducted with a variety of farmers who are likely to represent a wide cross-section of interests in the farming community (e.g. small and large farms), but farmers can be selected by either stopping en route at systematic intervals and interviewing farmers who can be obtained, or by selecting 1 or 2 'typical' villages and interviewing a number of farmers in each.

**Key informants:** One rapid way to learn a great deal about a local farming system is to identify 'key informants' in the villages, i.e. individuals who have great knowledge about the village, the farms, crops and local conditions and problems (for example village elders, heads, large farmers). One should not believe everything key informants say but likewise one should not disregard the old timer who enjoys talking. Usually one will only be able to obtain qualitative data in the sense that most comments made by key informants will be about farmers' problems and conditions. However, if the interviewer asks the right questions, some quantitative data can be collected. For example average farm sizes in the area, or the number of farmers in the village.

Techniques such as ranking exercises are used as a quick means of finding out an individual's or a group's lists of preferences and priorities, and identification of wealth distribution, as well as seasonal changes in the lives of rural people (for example distribution of productive activities, changes in prices, availability of inputs, rainfall periods, etc.).

**Recording rapid rural appraisal data:** Although data collected through a rapid appraisal is usually for the purposes of one planned survey, it is imperative that the information is recorded in a form which will be useful to subsequent surveys in the longer term. The data should be recorded in such a way that a data-base can be constructed for use as reference material for all future surveys.

- 1 The results of appraisal field research conducted by each team for each area should be fully written up in a common format. A useful format would be to construct 'data sheets' on which comments are recorded under the headings outlined earlier.
- 2 The results of each team's appraisal maps and data sheets should be combined into 'master sheets' to enable subsequent ease of reference and storage.
- 3 Successive appraisal maps should use common scales, keys, symbols, colours, etc. making comparison between two areas and two appraisals possible.

<b>Rapid Rural Appraisal Summary</b>		Date _____
Entry	Team _____ Area _____	Team _____ Team _____
Main crops		
Land use intensity		
Extent of Inter cropping		
Soil type		
Farm size		

Figure 8.6 Rapid rural appraisal summary

# The Rapid Rural Marketing Appraisal report

The entire RRMA research process and particularly the report should be made "transparent" to readers of the research, and that concerns reliability and replicability of findings. It is the responsibility of the researcher to demonstrate how his or her conclusions were derived from the data, and in such a way that someone else can follow and, if necessary, replicate the analysis and achieve the same result or dispute those conclusions. As a result, the researcher has to "defend" the validity of his/her research findings and of the whole process, including the general constraints of the context, and the particular constraints when collecting and analysing the data. All these considerations have to be reflected in the research report.

A framework for the definition of criteria for the characteristics for the validity of the RRMA report might be:

1. **Natural History:** report of which avenues were followed and which were rejected. Discussion of policy context in which the research was conceived, the original purpose of the study and the initial design; how these developed, and what factors or findings led to major shifts in direction, and how the report relates to the policy context
2. **Data collected and techniques:** discussion of whether the kind of data collected is that demanded by the research problem. Evaluation of the data quality. Evaluation of procedures followed for data collection.
3. **Analysis:** suitability of analysis (rigorous, systematic, comprehensive and sensitive) and illumination of policy problem by the data. Evaluation of data analysis procedures.
4. **Validity of links between concepts and indicators:** considerations of descriptive validity: events and indicators being really what they are thought to be; and considerations of conceptual validity: extent to which the concepts and categories used fit the data.
5. **Validity of hypotheses or theories:** considerations of theoretical validity; way in which concepts are handled and the "coherence" of the resulting theory.
6. **Theory kept to the limits imposed by sampling selection:** considerations of external validity. Scope and generalisation of the theory dependent on the samples used. Replicability considerations.
7. **External theoretical validity of the research:** relationship of the study to the wider body of knowledge related. Value placed on the research by those who commissioned it, and value for all the people concerned and involved. Project's impact on the definition, development and understanding of policy. Contribution made to the general body of knowledge.

## Chapter Summary

Rapid Rural Marketing Appraisal (RRMA) emphasises the essential role that marketing plays in the rural development process for Third World countries, and stresses that it is necessary to appreciate the role of "good" rural marketing research to reduce the risk in rural marketing decision making. RRMA (as an agricultural marketing research approach) represents the contextual understanding of agricultural marketing systems, and the application of ad hoc techniques - as well as correct adaptation of techniques by offsetting and to some extent overcoming the difficulties of carrying out research in the rural environment of developing countries. However, the utilisation of RRMA has to overcome a good number of misconceptions about how the ideal marketing research has to be, since decision makers feel themselves more confident when supporting the decisions in "cold" figures rather than in actual understanding. Moreover, they feel it is always required to have formal quantitative surveys, motivated more by avoiding the negative results than by the positive expectations.

First of all, RRMA represents a paradigm to understand rural development and its marketing implications: understanding development as the result of:

- a) the complex interaction of variables and context, having multiple and changing relationships, and
- b) the necessary involvement and participation of farmers (and rural people in general), since the very research process, perceives research as a mutual learning process, including also the research component in the formulation and monitoring of development projects.

The process implies not only the generation of projects for the improvement of "pure" marketing functions. RRMA is indeed a very powerful tool to understand the final marketing implications of every endeavour; after all, development necessarily depends upon the degree to which the prospective beneficiaries recognise it as useful to them.

RRMA understands marketing systems in all their complexity and final implications. The interaction and sharing of insights by multidisciplinary researchers avoids the biased partial views, by analysing the systems (agro-ecosystems) performance, and understanding that they are the result of the interaction of social and natural elements. RRMA analyses the structure of systems and provides a means of predicting the effects of changes and suggesting improvement actions.

RRMA also considers research as searching for and analysing data in a fast and cost-effective way. Moreover, RRMA does not only consider the requirement of the fair amount and the fair quality of the information to support marketing decisions, but also gives sufficient openness to accept and incorporate unexpected but relevant information in an ongoing process. RRMA links flexible techniques in a coherent form to collect on-site, cross-check, validate and analyse data according to those priorities. Equally important, RRMA considers simplicity, relevance and meaning as basic points in presenting findings and suggesting action.

RRMA takes into account the huge cultural diversity of groups of rural population in developing countries. Secondary data collection, direct observation and semi-structured interviewing are very useful techniques for the full on-site understanding and cultural adaptation required by research, if it is objective. Moreover, the participation of farmers in the research process, as well as the inclusion of local researchers and researchers with knowledge about the site and having multiple disciplines, all contribute towards overcoming the difficulties in adaptation of the research to the local conditions, i.e. the adaptation to cultural values and beliefs, language, perception patterns, productive activities, economies, traditions, religion, ethical features, politics, and so on.

RRMA offers a reasonable contribution towards overcoming the difficulties of sampling in a rural environment. It avoids the biases of "rural-tourism" research, and tries to study the events on-site, just where they occur or where the evidence is. As a result, RRMA information, limited obviously by the scope of the investigation, generates a purposive sampling frame of key and casual informants and geographical unbiased transects, without strict statistical representativeness, but with high natural-objective representativeness. This representativeness is enhanced by the triangulation procedures, resulting in increased validity.

RRMA proposes gaining accessibility to rural people by involving them in the research process, that is in learning, collecting, finding and analysing information in open discussions and total interaction. As a result, this participatory research also increases accessibility to sites. In addition, the use of key indicators and the information provided by key informants allows access to information otherwise hard to gather. Other techniques, and especially the case of aerial photography, provide a means of gathering information otherwise not accessible, or difficult to appreciate in all its magnitude.

RRMA is an emerging approach, evolving and improving, and therefore it is still limited. There are types of research than RRMA cannot do, for example that requiring statistical reliability, strict replicability and quantitatively precise conclusions. However, it seems to be always useful in exploring, complementing, supplementing and validating other types of marketing research - that is to say more formal types - in rural environments. Its usefulness will depend on the particular interests of each piece of research, but it is always a viable alternative.

## Key Terms

Aerial photographs	Multidiscipline teams	Social marketing
Base maps	Quick-and-dirty methods	Systematic recording
Continuous recording	Rapid Rural Marketing Appraisal	Transects
Key informants		

## Review Questions

From your knowledge of the material in this chapter, give brief answers to the following questions:

1. Explain the meaning of the term 'systematic step recording'.
2. Explain what is meant by 'a transect'.
3. Who are 'key informants'?
4. What weaknesses did McCracken identify in conventional long-term studies?
5. How is triangulation applied within the context of rapid rural appraisals?
6. What are the 3 core field operating principles mentioned in the textbook?
8. Up until now what has been the principal application of rapid rural appraisal?
7. What advice is given regarding the right size of a multidisciplinary team carrying out a rapid appraisal?

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# Marketing Information Systems

## Chapter

## 9

To understand the proper role of information systems one must examine what managers do and what information they need for decision making. We must also understand how decisions are made and what kinds of decision problems can be supported by formal information systems. One can then determine whether information systems will be valuable tools and how they should be designed.

### Chapter Objectives

This chapter has the purpose of leading the reader towards:

- An understanding of the different roles managers play and how marketing information systems can support them in these roles
- An appreciation of the different types and levels of marketing decision making
- A knowledge of the major components of a marketing information system
- An awareness of the often under-utilised internal sources of information available to enterprises
- An ability to clearly distinguish between marketing research and marketing intelligence, and
- An understanding of the nature of analytical models within marketing information system.

### Structure of the Chapter

The chapter opens with a wide-ranging discussion of the functions of management, the various types and levels of decision that marketing managers must make. This then comprises the first half of the chapter whilst the second part deals with the main components of a marketing information systems.. Internal reporting systems, marketing research systems, marketing intelligence systems and analytical model banks are all discussed.

# The Functions of Management

Clearly, information systems that claim to support managers cannot be built unless one understands what managers do and how they do it. The classical model of what managers do, espoused by writers in the 1920's, such as Henry Fayol, whilst intuitively attractive in itself, is of limited value as an aid to information system design. The classical model identifies the following 5 functions as the parameters of what managers do:

- 1 Planning
- 2 Organising
- 3 Coordinating
- 4 Deciding
- 5 Controlling

Such a model emphasises what managers do, but not how they do it, or why. More recently, the stress has been placed upon the behavioural aspects of management decision making. Behavioural models are based on empirical evidence showing that managers are less systematic, less reflective, more reactive and less well organised than the classical model projects managers to be. For instance, behavioural models describe 6 managerial characteristics:

- High volume, high speed work
- Variety, fragmentation, brevity
- Issue preference current, *ad hoc*, specific
- Complex web of interactions, contacts
- Strong preference for verbal media.

Such behavioural models stress that managers work at an unrelenting pace and at a high level of intensity. This is just as true for managers operating in the developing world as in the developed world. The nature of the pressures may be different but there is no evidence that they are any less intense. The model also emphasises that the activities of managers is characterised by variety, fragmentation and brevity. There is simply not enough time for managers to get deeply involved in a wide range of issues. The attention of managers increase rapidly from one issue to another, with very little pattern. A problem occurs and all other matters must be dropped until it is solved. Research suggests that a manager's day is characterised by a large number of tasks with only small periods of time devoted to each individual task.

Managers prefer speculation, hearsay, gossip in brief, current, up-to-date, although uncertain information. Historical, certain, routine information receives less attention. Managers want to work on issues that are current, specific and *ad hoc*.

Managers are involved in a complex and diverse *web of contacts* that together act as an information system. They converse with customers, competitors, colleagues, peers, secretaries, government officials, and so forth. In one sense, managers operate a network of contacts throughout the organisation and the environment.

Several studies have found that managers prefer verbal forms of communication to written forms. Verbal media are perceived to offer greater flexibility, require less effort and bring a faster response. Communication is the work of the manager, and he or she uses whatever tools are available to be an effective communicator.

Despite the flood of work, the numerous deadlines, and the random order of crises, it has generally been found that successful managers appear to be able to control their own affairs. To some extent, high-level managers are at the mercy of their subordinates, who bring to their attention crises and activities that must be attended to immediately. Nevertheless, successful managers are those who can control the activities that they choose to get involved in on a day-to-day basis. By developing their own long-term commitments, their own information channels, and their own networks, senior managers can control their personal agendas. Less successful managers tend to be overwhelmed by problems brought to them by subordinates.

## Managerial Roles

Mintzberg suggests that managerial activities fall into 3 categories: interpersonal, information processing and decision making. An important interpersonal role is that of figurehead for the organisation. Second, a manager acts as a leader, attempting to motivate subordinates. Lastly, managers act as a liaison between various levels of the organisation and, within each level, among levels of the management team.

A second set of managerial roles, termed as informational roles, can be identified. Managers act as the nerve centre for the organisation, receiving the latest, most concrete, most up-to-date information and redistributing it to those who need to know.

A more familiar set of managerial roles is that of decisional roles. Managers act as entrepreneurs by initiating new kinds of activities; they handle disturbances arising in the organisation; they allocate resources where they are needed in the organisation; and they mediate between groups in conflict within the organisation.

In the area of interpersonal roles, information systems are extremely limited and make only indirect contributions, acting largely as a communications aid in some of the newer office automation and communication-oriented applications. These systems make a much larger contribution in the field of informational roles; large-scale MIS systems, office systems, and professional work stations that can enhance a manager's presentation of information are significant. In the area of decision making, only recently have decision support systems and microcomputer-based systems begun to make important contributions.

While information systems have made great contributions to organisations, until recently these contributions have been confined to narrow, transaction processing areas. Much work needs to be done in broadening the impact of systems on professional and managerial life.

## Decision Making

Decision making is often seen as the centre of what managers do, something that engages most of a managers time. It is one of the areas that information systems have sought most of all to affect (with mixed success). Decision making can be divided into 3 types: strategic, management control and operations control.

**Strategic decision making:** This level of decision making is concerned with deciding on the objectives, resources and policies of the organisation. A major problem at this level of decision making is predicting the future of the organisation and its environment, and matching the characteristics of the organisation to the environment. This process generally involves a small group of high-level managers who deal with very complex, non-routine problems.

For example, some years ago, a medium-sized food manufacturer in an East African country faced strategic decisions concerning its range of pasta products. These products constituted a sizeable proportion of the company's sales turnover. However, the company was suffering recurrent problems with the poor quality of durum wheat it was able to obtain resulting in a finished product that was too brittle. Moreover, unit costs were shooting up due to increasingly frequent breakdowns in the ageing equipment used in pasta production. The company faced the decision whether to make a very large investment in new machinery or to accept the offer of another manufacturer of pasta products, in a neighbouring country, that it should supply the various pasta products and the local company put its own brand name on the packs. The decision is strategic since the decision has implications for the resource base of the enterprise, i.e. its capital equipment, its work force, its technological base etc. The implications of strategic decisions extend over many years, often as much as ten to fifteen years.

**Management control decisions:** Such decisions are concerned with how efficiently and effectively resources are utilised and how well operational units are performing. Management control involves close interaction with those who are carrying out the tasks of the organisation; it takes place within the context of broad policies and objectives set out by strategic planners.

An example might be where a transporter of agricultural products observes that his/her profits are declining due to a decline in the capacity utilisation of his/her two trucks. The manager (in this case the owner) has to decide between several alternative courses of action, including: selling of trucks, increasing promotional activity in an attempt to sell the spare carrying capacity, increasing unit carrying charges to cover the deficit, or seeking to switch to carrying products or produce with a higher unit value where the returns to transport costs may be correspondingly higher. Management control decisions are more tactical than strategic.

**Operational control decisions:** These involve making decisions about carrying out the specific tasks set forth by strategic planners and management. Determining which units or individuals in the organisation will carry out the task, establishing criteria of completion and resource utilisation, evaluating outputs - all of these tasks involve decisions about operational control.

The focus here is on how the enterprises should respond to day-to-day changes in the business environment. In particular, this type of decision making focuses on adaptation of the marketing mix, e.g. how should the firm respond to an increase in the size of a competitor's sales force? should the product line be extended? should distributors who sell below a given sales volume be serviced through wholesalers rather than directly, and so on.

Within each of these levels, decision making can be classified as either structured or unstructured. Unstructured decisions are those in which the decision maker must provide insights into the problem definition. They are novel, important, and non-routine, and there is no well-understood procedure for making them. In contrast, structured decisions are repetitive, routine, and involve a definite procedure for handling them so that they do not have to be treated each time as if they were new.

Structured and unstructured problem solving occurs at all levels of management. In the past, most of the success in most information systems came in dealing with structured, operational, and management control decisions. However, in more recent times, exciting applications are occurring in the management and strategic planning areas, where problems are either semi-structured or are totally unstructured.

Making decisions is not a single event but a series of activities taking place over time. Suppose, for example, that the Operations Manager for the National Milling Corporation is faced with a decision as to whether to establish buying points in rural locations for the grain crop. It soon becomes apparent that the decisions are likely to be made over a period of time, have several influences, use many sources of information and have to go through several stages. It is worth considering the question of how, if at all, information systems could assist in making such a decision. To arrive at some answer, it is helpful to break down decision making into its component parts.

The literature has described 4 stages in decision making: *intelligence, design, choice and implementation*. That is, problems have to be perceived and understood; once perceived solutions must be designed; once solutions are designed, choices have to be made about a particular solution; finally, the solution has to be implemented.

*Intelligence* involves identifying the problems in the organisation: why and where they occur with what effects. This broad set of information gathering activities is required to inform managers how well the organisation is performing and where problems exist. Management information systems that deliver a wide variety of detailed information can be useful, especially if they are designed to report exceptions. For instance, consider a commercial organisation marketing a large number of different products and product variations. Management will want to know, at frequent intervals, whether sales targets are being achieved. Ideally, the information system will report only those products/product variations which are performing substantially above or below target.

*Designing many possible solutions* to the problems is the second phase of decision making. This phase may require more intelligence to decide if a particular solution is appropriate. Here, more carefully specified and directed information activities and capabilities focused on specific designs are required.

*Choosing among alternative solutions* is the third step in the decision making process. Here a manager needs an information system which can estimate the costs, opportunities and consequences of each alternative problem solution. The information system required at this stage is likely to be fairly complex, possibly also fairly large, because of the detailed analytic models required to

calculate the outcomes of the various alternatives. Of course, human beings are used to making such calculations for themselves, but without the aid of a formal information system, we rely upon generalisation and/or intuition.

*Implementing* is the final stage in the decision making process. Here, managers can install a reporting system that delivers routine reports on the progress of a specific solution, some of the difficulties that arise, resource constraints, and possible remedial actions. Table 9.1 illustrates the stages in decision making and the general type of information required at each stage.

Stage of Decision Making		Information Requirement
1	Intelligence	Exception reporting
2	Design	Simulation prototype
3	Choice	'What-if' simulation
4	Implementation	Graphics, charts

**Table 9.1 Stages in the decision making process**

In practice, the stages of decision making do not necessarily follow a linear path from intelligence to design, choice and implementation. Consider again the problem of balancing the costs and benefits of establishing local buying points for the National Milling Corporation. At any point in the decision making process it may be necessary to loop back to a previous stage. For example, one may have reached stage 3 and all but decided that having considered the alternatives of setting up no local buying points, local buying points in all regions, districts or villages, the government decides to increase the amounts held in the strategic grain reserve. This could cause the parastatal to return to stage 2 and reassess the alternatives. Another scenario would be that having implemented a decision one quickly receives feedback indicating that it is not proving effective. Again, the decision maker may have to repeat the design and/or choice stage(s).

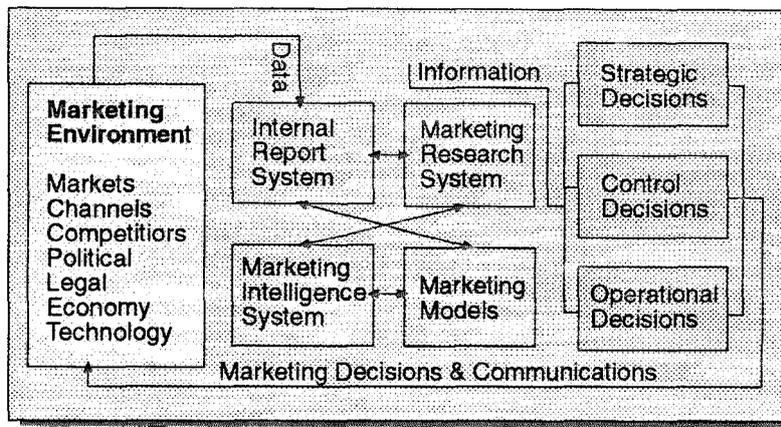
Thus, it can be seen that information system designers have to take into account the needs of managers at each stage of the decision making process. Each stage has its own requirements.

## Components of a marketing information system

A marketing information system (MIS) is intended to bring together disparate items of data into a coherent body of information. An MIS is, as will shortly be seen, more than raw data or information suitable for the purposes of decision making. An MIS also provides methods for interpreting the information the MIS provides. Moreover, as Kotler's<sup>1</sup> definition says, an MIS is more than a system of data collection or a set of information technologies:

"A marketing information system is a continuing and interacting structure of people, equipment and procedures to gather, sort, analyse, evaluate, and distribute pertinent, timely and accurate information for use by marketing decision makers to improve their marketing planning, implementation, and control".

Figure 9.1 illustrates the major components of an MIS, the environmental factors monitored by the system and the types of marketing decision which the MIS seeks to underpin.



**Figure 9.1** The marketing information systems and its subsystems

The explanation of this model of an MIS begins with a description of each of its four main constituent parts: the internal reporting systems, marketing research system, marketing intelligence system and marketing models. It is suggested that whilst the MIS varies in its degree of sophistication - with many in the industrialised countries being computerised and few in the developing countries being so - a fully fledged MIS should have these components, the methods (and technologies) of collection, storing, retrieving and processing data notwithstanding.

**Internal reporting systems:** All enterprises which have been in operation for any period of time have a wealth of information. However, this information often remains under-utilised because it is compartmentalised, either in the form of an individual entrepreneur or in the functional departments of larger businesses. That is, information is usually categorised according to its nature so that there are, for example, financial, production, manpower, marketing, stockholding and logistical data. Often the entrepreneur, or various personnel working in the functional departments holding these pieces of data, do not see how it could help decision makers in other functional areas. Similarly, decision makers can fail to appreciate how information from other functional areas might help them and therefore do not request it.

The internal records that are of immediate value to marketing decisions are: orders received, stockholdings and sales invoices. These are but a few of the internal records that can be used by marketing managers, but even this small set of records is capable of generating a great deal of information. Below, is a list of some of the information that can be derived from sales invoices.

- Product type, size and pack type by territory
- Product type, size and pack type by type of account
- Product type, size and pack type by industry
- Product type, size and pack type by customer
- Average value and/or volume of sale by territory
- Average value and/or volume of sale by type of account
- Average value and/or volume of sale by industry
- Average value and/or volume of sale by sales person

By comparing orders received with invoices an enterprise can establish the extent to which it is providing an acceptable level of customer service. In the same way, comparing stockholding records with orders received helps an enterprise ascertain whether its stocks are in line with current demand patterns.

**Marketing research systems:** The general topic of marketing research has been the prime subject of the textbook and only a little more needs to be added here. Marketing research is a proactive search for information. That is, the enterprise which

commissions these studies does so to solve a perceived marketing problem. In many cases, data is collected in a purposeful way to address a well-defined problem (or a problem which can be defined and solved within the course of the study). The other form of marketing research centres not around a specific marketing problem but is an attempt to continuously monitor the marketing environment. These monitoring or tracking exercises are continuous marketing research studies, often involving panels of farmers, consumers or distributors from which the same data is collected at regular intervals. Whilst the *ad hoc* study and continuous marketing research differs in the orientation, yet they are both proactive.

**Marketing intelligence systems:** Whereas marketing research is focused, market intelligence is not. A marketing intelligence system is a set of procedures and data sources used by marketing managers to sift information from the environment that they can use in their decision making. This scanning of the economic and business environment can be undertaken in a variety of ways, including<sup>2</sup>

Unfocused scanning	The manager, by virtue of what he/she reads, hears and watches exposes him/herself to information that may prove useful. Whilst the behaviour is unfocused and the manager has no specific purpose in mind, it is not unintentional
Semi-focused scanning	Again, the manager is not in search of particular pieces of information that he/she is actively searching but does narrow the range of media that is scanned. For instance, the manager may focus more on economic and business publications, broadcasts etc. and pay less attention to political, scientific or technological media.
Informal search	This describes the situation where a fairly limited and unstructured attempt is made to obtain information for a specific purpose. For example, the marketing manager of a firm considering entering the business of importing frozen fish from a neighbouring country may make informal inquiries as to prices and demand levels of frozen and fresh fish. There would be little structure to this search with the manager making inquiries with traders he/she happens to encounter as well as with other <i>ad hoc</i> contacts in ministries, international aid agencies, with trade associations, importers/exporters etc.
Formal search	This is a purposeful search after information in some systematic way. The information will be required to address a specific issue. Whilst this sort of activity may seem to share the characteristics of marketing research it is carried out by the manager him/herself rather than a professional researcher. Moreover, the scope of the search is likely to be narrow in scope and far less intensive than marketing research

Marketing intelligence is the province of entrepreneurs and senior managers within an agribusiness. It involves them in scanning newspaper trade magazines, business journals and reports, economic forecasts and other media. In addition it involves management in talking to producers, suppliers and customers, as well as to competitors. Nonetheless, it is a largely informal process of observing and conversing.

Some enterprises will approach marketing intelligence gathering in a more deliberate fashion and will train its sales force, after-sales personnel and district/area managers to take cognisance of competitors' actions, customer complaints and requests and distributor problems. Enterprises with vision will also encourage intermediaries, such as collectors, retailers, traders and other middlemen to be proactive in conveying market intelligence back to them.

**Marketing models:** Within the MIS there has to be the means of interpreting information in order to give direction to decision. These models may be computerised or may not. Typical tools are:

- Time series sales modes
- Brand switching models
- Linear programming

- Elasticity models (price, incomes, demand, supply, etc.)
- Regression and correlation models
- Analysis of Variance (ANOVA) models
- Sensitivity analysis
- Discounted cash flow
- Spreadsheet 'what if' models

These and similar mathematical, statistical, econometric and financial models are the analytical subsystem of the MIS. A relatively modest investment in a desktop computer is enough to allow an enterprise to automate the analysis of its data. Some of the models used are stochastic, i.e. those containing a probabilistic element whereas others are deterministic models where chance plays no part. Brand switching models are stochastic since these express brand choices in probabilities whereas linear programming is deterministic in that the relationships between variables are expressed in exact mathematical terms.

## Chapter Summary

Marketing information systems are intended to support management decision making. Management has five distinct functions and each requires support from an MIS. These are: planning, organising, coordinating, decisions and controlling.

Information systems have to be designed to meet the way in which managers tend to work. Research suggests that a manager continually addresses a large variety of tasks and is able to spend relatively brief periods on each of these. Given the nature of the work, managers tend to rely upon information that is timely and verbal (because this can be assimilated quickly), even if this is likely to be less accurate than more formal and complex information systems.

Managers play at least three separate roles: interpersonal, informational and decisional. MIS, in electronic form or otherwise, can support these roles in varying degrees. MIS has less to contribute in the case of a manager's informational role than for the other two.

Three levels of decision making can be distinguished from one another: strategic, control (or tactical) and operational. Again, MIS has to support each level. Strategic decisions are characteristically one-off situations. Strategic decisions have implications for changing the structure of an organisation and therefore the MIS must provide information which is precise and accurate. Control decisions deal with broad policy issues and operational decisions concern the management of the organisation's marketing mix.

A marketing information system has four components: the internal reporting system, the marketing research systems, the marketing intelligence system and marketing models. Internal reports include orders received, inventory records and sales invoices. Marketing research takes the form of purposeful studies either *ad hoc* or continuous. By contrast, marketing intelligence is less specific in its purposes, is chiefly carried out in an informal manner and by managers themselves rather than by professional marketing researchers.

## Key Terms

Deterministic models  
Internal reports  
Marketing intelligence

Model banks  
Operational decisions  
Stochastic models

Strategic decisions  
Tactical plans

## Review Questions

1. What are stochastic models?
2. Name the four components of an MIS.
3. What were the functions of management that Henry Fayol identified?
4. To which management role does the textbook suggest MIS has least to contribute?
5. What are the 3 levels of decision making outlined in this chapter?
6. According to Kotler, what are the contributing elements to an MIS?
7. Which elements of the marketing environment are mentioned in the chapter?
8. What differences are there between marketing research and marketing intelligence?

## Chapter References

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# Writing The Research Report

## Appendix

### A

#### General guidelines

The results of marketing research must be effectively communicated to management. Presenting the results of a marketing research study to management generally involves a formal written report as well as an oral presentation. The report and presentation are extremely important. First, because the results of marketing research are often intangible (after the study has been completed and a decision is made there is very little physical evidence of the resources, such as time and effort, that went into the project), the written report is usually the only documentation of the project. Second, the written report and the oral presentation are typically the only aspect of the study that marketing executives are exposed to, and consequently the overall evaluation of the research project rests on how well this information is communicated. Third, since the written research report and oral presentation are typically the responsibility of the marketing research supplier, the communication effectiveness and usefulness of the information provided plays a crucial role in determining whether that particular supplier will be used in the future.

Every person has a different style of writing. There is not really one right style for a report, but there are some basic principles for writing a research report clearly.

Preparing a research report involves other activities besides writing; in fact, writing is actually the last step in the preparation process. Before writing can take place, the results of the research project must be fully understood and thought must be given to what the report will say. Thus, preparing a research report involves three steps: understanding, organising and writing. The general guidelines that should be followed for any report or research paper are as follows:

**Consider the audience:** The information resulting from the study is ultimately of importance to marketing managers, who will use the results to make decisions. Thus, the report has to be understood by them; the report should not be too technical and not too much jargon should be used. This is a particular difficulty when reporting the results of statistical analysis where there is a high probability that few, if any, of the target audience have a grasp of statistical concepts. Hence, for example, there is a need to translate such terms as standard deviation, significance level, confidence interval etc. into everyday language. This is sometimes not an easy task but it may be the case that researchers who find it impossible do not themselves have a sufficiently good grasp of the statistical methods they have been using.

Qualitative research also presents difficulties. The behavioural sciences have their own vocabulary, much of which is not encountered in everyday speech. Examples include: cognitive dissonance, evoked set, perception, needs versus wants, self-actualisation. It should be noted that these are extreme examples; many words, phrases and concepts used a very precise way by behavioural scientists are also present in everyday speech but often in a less precise or different way. This also presents opportunities for misunderstandings.

**Be concise, but precise:** On the one hand, a written report should be complete in the sense that it stands by itself and that no additional clarification is needed. On the other hand, the report must be concise and must focus on the critical elements of the project and must exclude unimportant issues. There is a great temptation, on the part of inexperienced researchers, to seek to convey all that they did in order to obtain information and to complete the research. This is done almost as if the researcher is afraid that the audience will not otherwise appreciate the time, effort and intellectual difficulties involved. What the researcher has to come to realise is that he/she will be judged by the contribution towards solving the marketing problem and not by the elegance or effort involved in the research methodology.

**Understand the results and drawing conclusions:** The managers who read the report are expecting to see interpretive conclusions in the report. The researcher must therefore understand the results and be able to interpret these. Simply reiterating facts will not do, and the researcher must ask him/herself all the time "So what?"; what are the implications. If the researcher is comparing the client's product with that of a competitor, for example, and reports that 60 percent of respondents preferred brand A to brand B, then this is a description of the results and not an interpretation of them. Such a statement does not answer the 'So what?' question.

The following outline is the suggested format for writing the research report:

- Title page
- Summary of findings
- Table of contents
- List of tables
- List of figures

## Introduction

- Background to the research problem
- Objectives
- Hypotheses

## Methodology-Data collection

- Sample and sampling method
- Statistical or qualitative methods used for data analysis
- Sample description

## Findings

- Results, interpretation and conclusions.

The summary of findings is perhaps the most important component of the written report, since many of the management team who are to receive a copy of the report will only read this section. The summary of findings is usually put right after the title page, or is bound separately and presented together with the report.

The introduction should describe the background of the study and the details of the research problem. Following that, automatically the broad aim of the research can be specified, which is then translated into a number of specific objectives. Furthermore, the hypotheses that are to be tested in the research are stated in this section.

In the methodology chapter the sampling methods and procedures are described, as well as the different statistical methods that are used for data analysis. Finally, the sample is described, giving the overall statistics, usually consisting of frequency counts for the various sample characteristics.

Once the sample has been described, the main findings are to be presented in such a way that all objectives of the study are achieved and the hypotheses are tested. As mentioned before, it is essential that the main findings are well interpreted and conclusions are drawn wherever possible.

## **Data presentation**

Easy-to-understand tables and graphics will greatly enhance the readability of the written research report. As a general rule, all tables and figures should contain:

1. Identification number corresponding to the list of tables and the list of figures
2. A title that conveys the content of the table or figure, also corresponding to the list of tables and the list of figures, and
3. Appropriate column labels and row labels for tables, and figure legends defining specific elements in the figure.

There are a number of ways to produce tables and figures. When typing a report on a typewriter or word-processor, it is sometimes easiest to type a table out by hand. However, when complicated tables have to be produced, it is advisable to use spreadsheet software like Lotus 123 or Excel.

## GLOSSARY OF MARKETING TERMS

- Aided recall.** Respondents are asked if they remember a commercial for the brand being tested.
- Alternative hypothesis.** A competing hypothesis to the null.
- Attitude.** A learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object.
- Audit.** A formal examination and verification of either how much of a product has sold at the store level (retail audit) or how much of a product has been withdrawn from warehouses and delivered to retailers (warehouse withdrawal audits).
- Balanced scale.** Scale using an equal number of favourable and unfavourable categories.
- Banner.** The variables that span the columns of the cross-tab; generally represents the subgroups being used in the analysis.
- Before-after design.** Experiment where a measurement is taken from respondents before they receive the experimental treatment condition; the experimental treatment is then introduced, and the post-treatment measurement is taken.
- Before-after with control design.** Experiment that adds a control group to the basic before-after design; the control group is never exposed to the experimental treatment.
- Between-group variations.** Between-group differences in scores for groups that were exposed to different treatments - represents "explained" variation.
- Blind testing.** Tests where the brand name of the product is not disclosed during test.
- Cartoon completion test.** Projective technique that presents respondents with a cartoon of a particular situation and asks them to suggest the dialogue that one cartoon character might make in response to the comment(s) of another cartoon character.
- Causality.** Relationship where a change in one variable produces a change in another variable. One variable affects, influences, or determines some other variable.
- Chi-square test statistic.** Measure of the goodness of fit between the numbers observed in the sample and the numbers we should have seen in the sample, given the null hypothesis is true.
- Cognition.** A person's knowledge, opinions, beliefs and thoughts about the object.
- Comparative scaling.** (non-metric scaling) Scaling process in which the subject is asked to compare a set of stimulus objects directly with one another.
- Comparison product test.** Designs where a consumer rates products by directly comparing two or more products.
- Concept board.** Illustration and copy describing how the product works and its end-benefits.
- Concept evaluation tests.** Concept tests designed to gauge consumer interest and determine strengths and weaknesses of the concept.
- Concept screening test.** Concept tests for screening new product ideas or alternative end-benefits for a single product idea.
- Concept test.** Collection of information on purchase intentions, likes/dislikes and attribute rating in order to measure the relative appeal of ideas or alternative positioning and to provide direction for the development of the product and the product advertising.
- Concept.** An idea aimed at satisfying consumer wants and needs.

- Concept/construct.** Names given to characteristics that we wish to measure.
- Confidence interval.** Range into which the true population value of the characteristic being measured will fall, assuming a given level of certainty.
- Confounds or confounding variables.** Extraneous causal factors (variables) that can possibly affect the dependent variable and, therefore, must be controlled.
- Connotative meaning.** The associations that the name implies, beyond its literal, explicit meaning; the imagery associated with a brand name.
- Constant sum scale.** Procedure whereby respondents are instructed to allocate a number of points or chips among alternatives according to some criterion - for example, preference, importance, and so on.
- Constitutive definition.** Specifications for the domain of the constructs of interest so as to distinguish it from other similar but different constructs.
- Continuous rating scale.** (graphic rating scale) Procedure that instruct the respondent to assign a rating by placing a marker at the appropriate position on a line that best describes the object under study.
- Control test market.** Method in which the entire test market project is handled by an outside research company.
- Copy recall.** Percentage of respondents in the programme audience that correctly recalled copy elements in the test commercial.
- Cross-price elasticity of demand.** The percentage of change in demand for one product divided by the percentage change in price of the second product, assuming that all other factors affecting demand are constant.
- Diary panels.** Samples of households that have agreed to provide specific information regularly over an extended period of time. Respondents in a diary panel are asked to record specific behaviours as they occur, as opposed to merely responding to a series of questions.
- Delphi method.** A method of forecasting based on asking a group of experts for their best estimate of a future event, then processing and feeding back some of the information obtained, and then repeating the process; on the last set of responses, the median is usually chosen as the best estimate for the group.
- Dependent variable.** A variable whose value is thought to be affected by one or more independent variables. For instance, sales (dependent variable) are likely to be a function of advertising, availability, price, degree of competitive advantage, customer tastes, etc.
- Depth interview ("one-on-one").** Sessions in which free association and hidden sources of feelings are discussed, generally through a very loose, unstructured question guide, administered by a highly skilled interviewer. It attempts to uncover underlying motivations, prejudice, attitudes toward sensitive issues, etc.
- Dollar metric scale.** (graded paired comparison) Scale that extends the paired comparison method by asking respondents to indicate which brand is preferred and how much they are willing to pay to acquire their preferred brand.
- Double-barrelled questions.** Questions in which two opinions are joined together.
- Dummy magazine test.** A realistic-looking test format using a dummy magazine that systematically varies the advertisements in such a way that some families receive magazine containing the test ad and other (matched) families receive a dummy magazine containing no ads at all.
- Duo-trio designs.** Test where a respondent is given a standard product and asked to determine which of two other products is more similar.
- Electronic process.** Review of the questionnaires for maximum accuracy and precision.

**Ethnography.** The systematic recording of human cultures.

**Experimental design.** A contrived situation designed so as to permit the researcher to manipulate one or more independent variables whilst controlling all extraneous variables and measuring the resultant effects on a dependent variable.

**Filter question.** A question that is asked to determine which branching question, if any, will be asked.

**Focus group interview.** Interview in which the interviewer listens to a group of individuals, who belong to the appropriate target market, talk about an important marketing issue.

**Forced itemised test.** Procedure in which a respondent indicates a response on a scale, even though he or she may have "no opinion" or "no knowledge" about the question.

**Frequency distribution.** The number of respondents who choose each alternative answer as well as the percentage and cumulative percentage of respondents who answer.

**Funnel sequence.** The procedure of asking the most general (or unrestricted) question about the topic under study first, followed by successively more restricted questions.

**Gross incidence.** Product/category use incidence for the entire population.

**Hypothesis.** An assumption or guess the researcher or manager has about some characteristic of the population being sampled.

**Independent variable.** A variable over which the researcher is able to exert some control with a view to studying its effect upon a dependent variable. For instance, an experiment may be conducted where the price (independent variable) of a dozen boxed carnations is varied and the sales (dependent variable) is observed at each price set.

**Internal secondary data.** Data available within the organisation - for example, accounting records, management decision support systems, and sales records.

**Interval data.** Measurements that allow us to tell how far apart two or more objects are with respect to attributes and consequently to compare the difference between the numbers assigned. Because the interval data lack a natural or absolute origin, the absolute magnitude of the numbers cannot be compared.

**Itemised (closed-ended) questions.** Format in which the respondent is provided with numbers and/or predetermined descriptions and is asked to select the one that best describes his or her feelings.

**Itemised rating scaling.** The respondent is provided with a scale having numbers and/or brief descriptions associated with each category and asked to select one of the limited number of categories, ordered in terms of scale position, that best describes the object under study.

**Judgemental sampling.** Studies in which respondents are selected because it is expected that they are representative of the population of interest and/or meet the specific needs of the research study.

**Judgemental data.** Information generally based on perceptions or preference may give better indications of future patterns of consumption.

**Jury of expert opinion.** A method of forecasting based on combining the views of key executives.

**Laboratory experimental environment.** Research environment constructed solely for the experiment. The experiment has direct control over most, if not all, of the crucial factors that might possibly affect the experimental outcome.

**Likert scale.** Scaling technique where a large number of items that are statements of belief or intention are generated. Each item is judged according to whether it reflects a favourable or unfavourable attitude toward the object in question. Respondents are then asked to rate the attitude towards the object on each scale item in terms of a five-point category labelled scale.

**Line marking.** Similarity judgements recorded by making a mark on a 5-inch line anchored by the phrases "exactly the same" and "completely different".

**Line marking/continuous rating non-comparative scale.** Procedure that instructs the respondent to assign a rating by placing a marker at the appropriate position on a line that best describes the object under study. There is no explicit standard for comparison.

**Loaded questions.** Questions that suggest what the answer should be or indicate the researcher's position on the issue under study.

**Loadings.** Weightings that give the correlation of the attribute with respect to the dimension.

**Magnitude estimation.** Scale in which respondents assign numbers to objects, brands, attitude statements, and the like so that ratios between the assigned numbers reflect ratios among the objects on the criterion being scaled.

**Mail diary services.** General term for services involving a sample of respondents who have agreed to provide information such as media exposure and purchase behaviour on a regular basis over an extended period of time.

**Mail surveys.** Data-collection method that involves sending out a fairly structured questionnaire to a sample of respondents.

**Mall-intercept personal survey.** Survey method using a central-location test facility at a shopping mall; respondents are intercepted while they are shopping.

**Market segment.** Subgroups of consumers who respond to a given marketing-mix strategy in a similar manner.

**Maturation.** Threat to internal validity; refers to changes in biology or psychology of the respondent that occur over time and can affect the dependent variable irrespective of the treatment conditions.

**Measurement.** Process of assigning numbers to objects to represent quantities of attributes.

**Monadic products test.** Designs where a consumer evaluates only one product, having no other product for comparison.

**Mortality.** Threat to internal validity; refers to the differential loss (refusal to continue in the experiment) of respondents from the treatment condition groups.

**Nominal data.** Measurement in which the numbers assigned allow us to place an object in one and only one of a set of mutually exclusive and collectively exhaustive classes with no implied ordering.

**Non-comparative scaling (monadic scaling).** Scaling method whereby the respondent is asked to evaluate each object on a scale independently of the other objects being investigated.

**Non-probability samples.** Form of sampling where there is no way of determining exactly what the chance is of selecting any particular element or sampling unit into the sample.

**Non-response error.** Error that occurs because not all of the respondents included in the sample respond; in other words with non-response, the mean true value (on the variable of interest) of the sample respondents who do respond may be different from the entire sample's true mean value (on the variable of interest).

**Non-sampling error.** Degree to which the mean observed value (on the variable of interest) for the respondent of a particular sample agrees with the mean true value of the particular sample of respondents (on the variable of interest).

**Observational methods.** Observation of behaviour, directly or indirectly, by human or mechanical methods.

**Optical scanning.** Direct machine reading of numerical values or alphanumeric codes and transcription onto cards, magnetic tape, or disk.

**Order bias.** Condition whereby brands receive different ratings depending on whether they were shown first, second, third, etc.

**Ordinal data.** Measurement in which the response alternatives define an ordered sequence so that the choice listed first is less (greater) than the second, the second less (greater) than the third, and so forth. The numbers assigned do not reflect the magnitude of an attribute possessed by an object.

**Over-registration.** Condition that occurs when a sampling frame consists of sampling units in the target population plus additional units as well.

**Paired comparison designs.** Tests where a consumer directly compares two products.

**Paired comparison scale.** Scale that presents the respondent with two objects at a time and asks the respondent to select one of the two according to some criterion.

**Primary data.** Data collected for a specific research need; they are customised and require specialised collection procedures.

**Print ad tests.** Attempts to assess the power of an ad placed in a magazine or newspaper to be remembered, to communicate, to affect attitudes, and ultimately, to produce sales.

**Probability sampling designs.** Samples drawn in such a way that each member of the population has a known, non-zero chance of being selected.

**Project proposal.** A written description of the key research design that defines the proposed study.

**Projective techniques.** A class of techniques which presume that respondents cannot or will not communicate their feelings and beliefs directly; provides a structured question format in which respondents can respond indirectly by projecting their own feelings and beliefs into the situation while they interpret the behaviour of others.

**Proportional allocation.** Sampling design guaranteeing that stratified random sampling will be at least as efficient as SRS. The number of elements selected from a stratum is directly proportional to the size of the stratum.

**Purchase intent scale.** Procedure attempting to measure a respondent's interest in a brand or product.

**Q-sort scale.** Rank order procedure in which objects are sorted into piles based on similarity with respect to some criterion.

**Qualitative research methods.** Techniques involving relatively large numbers of respondents, which are designed to generate information that can be projected to the whole population.

**Quota sampling.** Design that involves selecting specific numbers of respondents who possess certain characteristics known, or presumed, to affect the subject of the research study.

**Random sampling error.** Error caused when the selected sample is an imperfect representation of the overall population; therefore, the true mean value for the particular sample of respondents (on the variable of interest) differs from the true mean value for the overall population (on the variable of interest).

**Random sources of error.** Denoted by  $X$ , component made up of transient personal factors that affect the observed scale score in different ways each time the test is administered.

**Range.** Differences between largest and smallest values of distribution.

**Rank-order scale.** Scale in which respondents are presented with several objects

simultaneously and requested to "order" or "rank" them.

**Ratio data.** Measurements that have the same properties as interval scales, but which also have a natural or absolute origin.

**Recall.** Measures of how many people remember having seen the test ad both on an unaided and aided basis.

**Related samples.** The measurement of the variables of interest in one sample can affect the measurement of the variable in some other sample.

**Residual.** An error term representing the difference between the actual and predicted values of the dependent variable.

**Response error.** Error that occurs because respondents (who do respond) may give inaccurate answers, or a respondent's answers may be misrecorded.

**Response rates.** The total number of respondents sent questionnaires who complete and return them, expressed as a percentage.

**Sample two-stage cluster sampling.** Design in which the clusters at the first stage are selected by SRS; at the second stage the sampling units are selected probabilistically by SRS from each sample cluster so that with clusters of equal size the same fraction of sampling units is drawn from each sample cluster.

**Sample.** A subset of the target population from which information is gathered to estimate something about the population.

**Sampling frame.** An explicit list of individuals or households that are eligible for inclusion in the sample.

**Sampling interval.** Computed by taking  $n/N$  together with  $r$ , the first chosen element to be included in the sample, determines which elements will be included in the sample.

**Sampling units.** The elements that make up the population.

**Sampling variable.** Variable that represents the characteristic of the population that we wish to estimate.

**Sampling.** Identification of a group of individuals or households (or institutions or objects) that can be reached by mail, telephone, or in person, and that possess the information relevant to solving the marketing problem at hand.

**Scale transformation.** Procedures for transforming data by one of a number of simple arithmetic operations to make comparisons across respondents and/or scale items.

**Secondary data.** Data that have been collected for another project and have already been published. Sources can be in-house or external.

**Selection bias.** Threat to internal validity; refers to the improper assignment of respondents to treatment conditions.

**Semantic differential scale.** Semantic scale utilising bi-polar adjectives as end points.

**Sentence completion.** Projective technique whereby respondents are asked to complete a number of incomplete sentences with the first word or phrase that comes to mind.

**Simple one-stage cluster sampling.** One-step design in which the first stage clusters all sampling units are selected by SRS, and within each selected cluster all sampling units are chosen.

**Simple random sampling.** Design guaranteeing that every sample of a given size as well as every individual in the target population has an equal chance of being selected.

- Simple weighting.** Procedure that attempts to remove non-response bias by assigning weights to the data that in some sense account for non-response.
- Simulated test market.** Method whereby various groups of pre-selected respondents are interviewed, monitored and sampled about the new product; in addition, respondents may be exposed to various media messages in a controlled environment.
- Single-stage cluster sample.** One step design where, once the sample of clusters is selected, every sampling unit within each of the selected clusters is included in the sample.
- Snowball design.** Sample formed by having each respondent, after being interviewed, identify others who belong to the target population of interest.
- Split-halves.** Scale items split in terms of odd-and even-numbered items or randomly.
- Standard deviation.** Index of variability in the same measurement units used to calculate the mean.
- Standard error (s).** Indication of the reliability of an estimate of a population parameter; it is computed by dividing the standard deviation of the sample estimate by the square root of the sample size.
- Stapel scale.** Procedure using a single criterion or key word and instructing the respondent to rate the object on a scale.
- Store audits.** Studies that monitor performance in the marketplace among dollar and unit sales/share, distribution/out of stock, inventory, price, promotional
- Stratified sampling.** Design that involves partitioning the entire population of elements into sub-population, called strata, and then selecting elements separately from each sub-population.
- Survey.** A method of gathering information from a number of individuals (the respondents, who collectively form a sample) in order to learn something about a larger target population from which the sample was drawn.
- Syndicated research services.** Market research suppliers who collect data on a regular basis with standardised procedures. The data are sold to different clients.
- Systematic sampling.** Design whereby the target sample is generated by picking an arbitrary starting point (in a list) and then picking every nth element in succession from a list.
- Systematic sources of error.** Denoted by X, component made up of stable characteristics that affect the observed scale score in the same way each time the test is administered.
- Target population.** Set of people, products, firms, markets, etc., that contain the information that is of interest to the researcher.
- Telephone surveys.** Survey that involves phoning a sample of respondents drawn from an eligible population and asking them a series of questions.
- Telescoping.** Condition that occurs when a respondent either compresses time or remembers an event as occurring more recently than it actually occurred.
- Test markets.** A system that allows the marketing manager to evaluate the proposed national marketing program in a smaller, less expensive situation with a view to determining whether the potential profit opportunity from rolling out the new product or line extension outweighs the potential risks.
- Thematic apperception test (TAT).** Projective technique presenting respondents with a series of pictures or cartoons in which consumers and products are the primary topic of attention.
- Third person/role playing.** Projective technique that represent respondents with a verbal or visual situation and asks them to relate the feelings and beliefs of a third person to the situation, rather than to directly express their own feelings and beliefs about the situation.

**Top-down approach.** Process of breaking down clusters: or, at the beginning, all respondents belong to one segment, and then respondents are partitioned into two segments, then three segments, and so on until each respondent occupies his or her own segment.

**Tracking.** System for measuring the key sales components of customer awareness and trail and repeat purchases.

**Trade-off procedure.** Technique where the respondent is asked to consider two attributes at a time - to rank the various combinations of each pair of attribute descriptions from a most preferred to least preferred.

**Treatment.** A reference to an independent variable that has been manipulated by the researcher. For example, a researcher may be investigating the customer benefits of three prototype packaging designs in order to determine which design to use. The independent variable which is manipulated is product packaging.

**Treatment.** Term for that independent variable that has been manipulated.

**Triangle designs.** Tests where a respondent is given two samples of one product and one sample of another and asked to identify the one that differs.

**Two-tail hypothesis test.** Test used when the alternative hypothesis is non-directional - the region of rejection is in both tails of the distribution.

**Type I error.** Situation occurring when the null hypothesis is in fact true, but is nevertheless rejected on the basis of the sample data.

**Type II or beta error.** Situation occurring when we fail to reject the null hypothesis ( $H_0$ ), when in fact the alternative ( $H_A$ ) is true.

**Unaided questions.** Questions that do not provide any clues to the answer.

**Unaided recall.** Respondents are asked if they remember seeing a commercial for a product in the product category of interest.

**Unbalanced scale.** Scale using an unequal number of favourable and unfavourable scale categories.

**Unfinished scenario story completion.** Projective technique whereby respondents complete the end of a story or supply the motive for why one or more actors in a story behaved as they did.

**Unstructured interview.** Method of interviewing where questions are not completely predetermined and the interviewer is free to probe for all details and underlying feelings.

**Utility scale values.** Ratings that indicate how influential each attribute level is in the consumer's overall evaluations.

**Validation.** Procedure where between 10 and 20 percent of all respondents "reportedly" interviewed are recontacted by telephone and asked a few questions to verify that the interview did in fact take place.

**Validity.** Refers to the best approximation to truth or falsity of a proposition, including propositions concerning cause-and-effect relationships.

**Word association.** Projective technique whereby respondents are presented with a list of words, one at a time, and asked to indicate what word comes immediately to mind.

