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ST. AUGUSTINE UNIVERSITY OF TANZANIA

RESEARCH METHODS

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Preface

This study manual equips the reader with research writing procedures from proposal stage to the report writing. The manual enables the reader to know what to be written, where to write and how to write in all chapters of a research report.

The study manual will take the reader through from identification of the research problem, defining research problem, purpose and specific objectives or hypotheses and review of literature both what to be reviewed and how to review. It also gives knowledge on what to be written under methodology chapter and how to write it and analyze to ensure that the methods used are able to answer the research questions and achieve the objectives of the study.

Results findings presentation after analysis is also shown in this manual to enable the reader to know what to be presented and how to present to enable easy interpretations of results. Finally the text explains what to be written and how to write it in the conclusion and recommendation chapters are explained.

Generally this text enlightens a reader on what to be written in any chapter of research and how to write both proposal and research reports.

NOTE: *What*- Shows meanings of terms and concepts, contents or elements to be included under each subheadings or chapter.

Where-This shows a chapter where content should be written or included

How-This is all how to write after knowing what and where to ensure logical flow of arguments.

Introductory remarks

Preparing the Research Report

Bringing a research effort to its rightful conclusion involves writing a report that is faithful to the data but also finds meaning in those data. The research report is a straightforward document that sets forth clearly and precisely what the researcher has done to resolve the research problem. In structure, it is factual and logical. Like the research proposal, it makes no pretense at being a work of fine literature. It must, however, be comprehensible, so that readers can easily grasp what the researcher has done and found. It must also be flawless in its sentence and paragraph structure, punctuation use, and spelling. The research document you write is a clear reflection of your scholarship as a researcher; this is why it is also often used as a culminating measure of a student's educational achievements.

Preliminary Pages

The preliminary pages include all the introductory material that precedes the discussion of the research problem and study. The title page comes first; this also includes the author and, typically, a university affiliation and date. In a thesis or dissertation, the title page is followed by a page for signatures of the faculty advisor(s). Next are an abstract, a page for the dedication (if any), an acknowledgment of indebtedness to those who have assisted in the research, a table of contents and lists of any tables and figures.

In some instances, copyright information is included on the title page or the page immediately after it. Copyright is the protection given by law to the authors of literary, dramatic, musical, artistic, and other intellectual works. A thesis or dissertation is protected by copyright law and does not need to be registered.

The abstract provides a summary of the entire research effort in a paragraph or two. For a journal article, the length of the abstract is usually 100 to 200 words, depending on the journal. For a dissertation, the abstract should be 350 words or less. The abstract should include sufficient information about the research problem, methodology, results, and interpretations to give potential readers an idea as to whether the study addresses a topic of concern to them and therefore merits their further attention. Remember, the abstract you write is likely to be included in one or more abstract collections (e.g. Dissertation Abstracts International or a published

collection of abstracts specific to your academic discipline) that then become available at many research libraries around the world. It is essential, therefore, that you take seriously the task of writing the abstract and describe your project as clearly, precisely, and succinctly as you possibly can

The acknowledgments page graciously recognizes the assistance of those through whose kindness the research effort has been possible. These people may include those who introduced the researcher to data sources that aided in completing the research or those who guided the study and gave counsel or support—perhaps an academic dissertation committee, a faithful typist and proofreader, and family members who encouraged and assisted in the research effort. The guild mark of education is to say thank you to those who have given their time and assistance to support your efforts and aspirations. The acknowledgments page is the proper place for the expression of such indebtedness.

The remainder of the front matter indicates the content and organization of the text. The most important of this material is the table of contents. The table of contents is a bird's-eye view of what the document contains how it is organized, and where each part can be found. Following the main table of contents are often two more specific ones, one for the tables and another for the figures that appear throughout the report.

Empirical research

Empirical research is a research that is based on observation and measurement of phenomena, as directly experienced by the researcher. The data thus gathered may be compared against a theory or hypothesis, but the results are still based on real life experience. The data gathered is all primary data**,** although secondary data from a literature review may form the theoretical background. Typically, empirical research embodies the following elements:

-A research question, which will determine research objectives.

-A particular and planned design for the research, which will depend on the question and which will find ways of answering it with appropriate use of resources.

-The gathering of primary data, which is then analyzed.

-A particular methodology for collecting and analyzing the data, such as an experiment or survey.

-The limitation of the data to a particular group, area or time scale, known as a sample: for example, a specific number of employees of a particular company type or all users of a library over given time scale. The sample should be somehow representative of a wider population.

-The ability to recreate the study and test the results. This is known as reliability.

-The ability to generalize from the findings to a larger sample and to other situations.

The theoretical framework

Empirical research is not divorced from theoretical considerations; and a consideration of theory should form one of the starting points of your research. This applies particularly in the case of management research which by its very nature is practical and applied to the real world. The link between research and theory is symbiotic: theory should inform research, and the findings of research should inform theory.

Good research

A good research is the one with the following qualities:

1. *Purpose clearly defined*

The problem being studied or decision to be made should be clearly stated. This should include its scope and the precise meanings of all words and terms significant to the research.

2. *Research process detailed to make the research replicable*

The research process should be described in sufficient detail to permit others to replicate it. Omission of significant detail brings to question the validity and reliability of the data and conclusions.

3. *Research design thoroughly planned*

Careful planning is important to ensure the research yields the maximum results that are objective and credible.

Ensure complete bibliographies, field notes and data collection. Minimize personal bias in selecting and recording data.

4. *High ethical standards*

The balance between the rights of the research subjects and the use of the scientific method chosen can be challenging. Any adverse effects of the research should be weighed against the research need. Sometimes the research may have to be redesigned.

5. *Limitations frankly revealed*

The researcher should report frankly flaws in procedural design and estimate their effect on findings. A reviewer of a research report is likely to question a research that does not report any limitations.

6. *Analysis adequate for decision making*

Data analysis methods used should be appropriate and the analysis adequate to provide insights for decision making.

Data should be classified in ways that enable the researcher to reveal how conclusions have been arrived at.

7. *Findings presented unambiguously*

Findings should be presented in:

-language that is restrained, precise and clear

-Assertions that are carefully drawn and hedged with appropriate reservations

-Maximum objectivity possible

-Avoid exaggerations, unnecessary verbiage and over generalization

For example avoid the following words: ….clearly…, …obvious…., enormously, impressive, overwhelmingly, exactly, the fact is...etc

8. *Conclusions justified*

Limit conclusions to those for which the data provide adequate basis. Avoid interpretations based on personal experiences (however difficult this might be). Avoid using conclusions from previous studies to interpret current research and finally specify the conditions under which the conclusions seem valid.

9. *Logical reasoning*

Research is guided by the rules of logical reasoning process of induction and deduction as follows:

Deduction is the process of reasoning from some premises (reasons) to a conclusion which follows from those premises (from general to particular). The conclusion must necessarily follow from the reasons/ premises given.

Induction is the process of reasoning from a part to a whole (from particular to general i.e. generalize). It involves drawing a conclusion from one or more facts or pieces of evidence

10. Empirical

This is field- based research that relies on one or more aspects of real situation, and deals with concrete data that provides the basis for external validity to research results. The research relies on experience or observations, often without due regard for system and theory in coming up with conclusions.

11. Researcher's experience reflected

It may be important for a researcher to include information on their personal qualifications, experience and personal interests in the research (often as part of justification for the research)

Introduction

Planning a Research Report

A research report has a relatively simple format. In general, it should achieve all objectives:

-It should give readers a clear understanding of the research problem and why it merited an in-depth investigation.

-It should describe exactly how data were collected in an attempt to resolve the problem.

-It should present the data precisely and completely. The data presented in the report should substantiate all the interpretations and conclusions that the report contains.

-It should interpret the data for the reader and demonstrate exactly how the data resolve the research problem. A report that merely presents raw data and un-interpreted facts (in the form of tables, graphs, and other data-summary devices) is of little help to the reader in deriving meaning from those data.

NOTE: A student should have in mind that there is no study without a problem. To have a researchable title or topic one has to use observations, experience, imaginations and from that one has to rectify that problem through literature review. The problem without extensive literature may not be a problem or simply may be perception.

Description of the Research Problem

The statement of the problem and any other information needed to understand it should comprise the first section or chapter of the final report. The reader should be able to comprehend from the report alone what the problem is and what its ramifications are.

The reader should appreciate the setting in which the problem was conceived. In addition, the reader should learn why, from both an academic and practical standpoint, the study was an important one to conduct.

The first section of the research report should have but one purpose: to create a meeting of minds between the writer and the readers of the report. Many research reports begin badly because their writers have not reconstructed the problem for the readers and set it forth clearly and completely. Such omissions get readers off to a confused start, which will impose a cloudy haze over the rest of the report. The writer of a research report must keep in mind that readers are likely to know only those things that the writer has actually put on paper.

After a few introductory comments (perhaps a few paragraphs) that provide the background and a rationale for the study, the document should set forth clearly and unmistakably the problem that has been researched. Often, an appropriate subheading can draw the reader's attention to the research problem.

If the problem has been divided into sub-problems, these should be presented following the statement of the problem and announced with proper subheadings. By presenting the problem and its sub-problems, the writer gives the reader a clear and complete understanding of the principal thrust of the research effort. With this thrust in mind, the reader will then be in a better position to understand the interpretation of the data and to judge the merits of the research.

Terms that may be ambiguous or are used in a specialized sense must be defined. For a meeting of minds, it is imperative that reader and researcher have the same orientations to the problem, the same concepts, and the same ideas. This is accomplished by careful definitions of any terms in either the problem or the sub-problems that may be open to varied interpretation.

A research report provides no opportunity for imprecise thought or inexact expression. Readers should see explicitly what hypotheses have been tested; they should know exactly what assumptions the researcher made in testing them.

Any delimitation should also be clearly set forth. All who read the research report should know precisely how far the research effort extended and where the limits were set. Into what relevant

areas did the research effort not inquire? What aspects of the problem have not been studied? Readers want answers to these questions, and they find those answers in the opening pages of the report.

The extent to which related literature is presented in the first section depends on the nature of the research report. In a journal article, the literature immediately relevant to the problem is summarized in the introductory paragraphs before the statement of the research problem. In a thesis or dissertation, only a few key works are identified in the first chapter, and the bulk of the literature is reserved for a separate, second chapter in the report.

The chapter serves to introduce the problem and the purpose of the study. It acquaints the reader with the problem. The following areas of discussion are frequently included as subsections in the introduction chapter.

Background of the Problem

In this section, the researcher defines the context of the study by providing a brief discussion of key theoretical approaches and findings reported in earlier related studies. Trends related to the problem, unresolved issues and social concerns are discussed. Authoritative sources or citations should be provided in the section.

Statement of the Problem

The problem statement describes the need for the research project in terms of the knowledge gap to be filled. The researcher should present a clear and precise statement that indicates the gap that previous research studies have not addressed. Authoritative sources or citations should be used to support the problem statement. Statement of the problem may also be termed as the research question

The starting point for your research should be your research question**.** This should be a formulation of the issue which is at the heart of the area which you are researching, which has the right degree of breadth and depth to make the research feasible within your resources. The following points are useful to remember when coming up with your research question (RQ):

1. The RQ should arise from your research stream, or topic of interest. This may come from:

-your doctoral thesis

-reading the relevant literature in journals, especially literature reviews which are good at giving an overview, and spotting interesting conceptual developments

-looking at research priorities of funding bodies, professional institutes etc

-going to conferences

-looking out for calls for papers

-developing a dialogue with other researchers in your area.

2. To narrow down your research topic, brainstorm ideas around it, possibly with your colleagues if you have decided to collaborate, noting all the questions down.

3. Come up with a "general focus" question; then develop some other more specific ones.

4. Having come up with your RQs, check that:

-they are not too broad

-they are not so narrow as to yield uninteresting results

-will the research entailed be covered by your resources, i.e. will you have sufficient time and money;

-there is sufficient background literature on the topic

-you can carry out appropriate field research

-you have stated your question in the simplest possible way.

Purpose of the Study or General Objective

In this section the major research objective is addressed. The purpose statement should emphasize practical outcomes or products of the study. For example, "The purpose of this study was to determine (measure, examine, or evaluate) factor that influence entrepreneurial behavior in family businesses".

Research Questions or Specific Objectives or Hypotheses

Specific research questions to be answered or specific objectives to be investigated should be stated. Either the research questions or specific objectives may be stated. However, most often research questions are preferred. The research questions need to be broad enough to allow further breakdown into questionnaire or interview guide items for the data collection. On the average 3-5 research questions are sufficient. The hypothesis should be stated if the study involves experimental designs or statistical tests.

Importance or Justification or Rationale of the Study

In this section the researcher describes the values or the benefits that will accrue from doing the study. The significance of the study is concerned with the relevance of the problem both to the practice and theory. That is, does the study explore an important question, meet a recognized need or make a useful contribution to practice and theory. Much value is placed on doing research, which has primary value for the solution of practical oriented business problems.

Scope of the Study

In this section, the researcher describes the focus or scope of the study to enable an enthusiastic reader to make generalization of the findings. The scope should address the limitations of the research in terms of geographical coverage, population or subjects, and time period involved.

The limitations should not be stated in terms of time or financial resources constraints. Researchers are expected to plan and implement research projects within the available time and financial resources.

Definition of Terms

It is necessary to provide definitions of unusual terminologies and concepts in the context of the study. The definitions should be based on authoritative or established sources or references.

Literature Review

The literature review section should present a review of the literature related to the problem or purpose of the study. The section should therefore be organized or structured according to the research questions or specific objectives in order to ensure relevance to the research problem.

The literature review examines recent (at most 10 years) research studies, company data or industry reports that act as a basis for the proposed study. Literature review is meant to give the reader an overview of previous relevant contributions to the problem so that they can better understand the research problem and methodology to be used in the study.

The chapter is the review of what others have done about your study. This should give previous answers to the purpose or general objective and specific objectives. The review should be sub-divided into sub- headings showing specific objectives. In general Literature review should be divided in sub titles according to the number of specific objectives. If not divided it should in anyway give answers to the objectives from other writers or authors.

Specifically, the purpose of literature review is to:

-Help eliminate duplication of what has been done.

-Provide a clear understanding of existing knowledge base in the problem area.

The literature review should be based on authoritative, recent, and original sources such as journals, books, thesis or dissertations. It should be written using appropriate writing styles such as the American Psychological Association (APA) style. This section should include:

-Introduction

-Sub sections as per the research questions or specific objectives

-Chapter summary

The purpose of the literature review

All literature reviews should be more than a mere description of the current state of knowledge of an area, and should critically evaluate the theoretical positions and research studies, drawing attention to major debates. This is particularly true for a research dissertation or paper, which should go one step further by using the review to situate the author's own contribution to knowledge.

The literature review has been described as a "report of primary scholarship" (Cooper, 1988) and "an interpretation and synthesis of published work" (Merriam, 1988, quoted by Murray, 2002). The two key words here are scholarship and synthesis**:** a literature review relates particular research to the wider field.

There are two main purposes of a literature review:

To show awareness of the present state of knowledge of a particular field: Not just who has written what, but the main empirical research, theoretical positions, controversies, and breakthroughs as well as links with other related areas of knowledge.

To provide a foundation for the author's research: The process of reviewing the literature should provide, according to Steane (2004: p. 124), a rationale for the choice of problem to be investigated and the methodology selected. It should help the researcher define a hypothesis or a research question, and show how answering the question will contribute to the body of knowledge. Analysis of the literature can also help provide a particular theoretical lens, support the argument, or identify gaps.

How to approach the literature review: organization

The author of an undergraduate essay may work from a reading list supplied by the relevant faculty member; the research student needs to cast his or her net far wider, over the whole field of literature relevant to the study. This is clearly a major task and requires organization.

Stages of writing a literature review

There are essentially four main stages of writing a literature review:

1. Defining the topic area of investigation.

2. Locating the key literature – this is the literature search.

3. Analyzing the literature.

4. Structuring and writing the literature review.

The last three items will be dealt with separately; here are a few points on general approach and organization.

General approach and organization

The topic area of investigation may initially be fairly broad; part of the function of the literature review is to refine it to a subject of the right size, and home in on a particular question. Initially it is important to identify the concepts within the overall topic.

Carrying out a literature search

This is clearly a key stage, and one that will help you come up with your main sources. There are a number of considerations.

What search terms will you use?

The most obvious way of searching is to use keywords based on the main concepts you have identified. However, you may be conscious of key scholars in the field, either from general reading or from talking to your supervisor, in which case you will want to search for them by name.

What will you search?

What type of literature will you look for? The basis of dissertation research is overwhelmingly likely to be scholarly articles, which are found in peer reviewed journals. Textbooks, encyclopedias, etc. generally report established knowledge rather than original research but are useful to get an overview of a particular issue and deepen your understanding.

Chapters from edited books may contain empirical research or conceptual analysis, and so may be suitable. Some major research studies are published in monographs or reports from government departments. If you are researching a topic with a strong applied content, you may well want to broaden your search to look at the practitioner literature, in order to consider the main debates among professionals.

Where will you search?

Familiarity with the main databases in your area is essential, and you will find it useful to talk to your subject librarian who will probably have a better idea of what is available than even an academic specialist.

Remember that some key journals may not be on databases and it is also a good idea to do an individual search of any key publications. You will almost certainly want to search the Internet itself, and while this may be a useful source of pre-printed articles, there are also huge pitfalls;

The literature itself may be a source of good leads: look for existing literature reviews on your subject/similar subjects. Also, keep an eye open for names which appear more than once: these are likely to be the key scholars in the area.

Finally, ask your supervisor and other established authorities in the area, who may be able not only to point you in useful directions, but also help you define your topic.

How old/recent?

While there are special circumstances for using old sources, for example in a historical study, the accepted practice is to use literature that is as recent as possible. This is because scholarship is cumulative, building on previous work.

It is also a common complaint of journal editors that papers submitted often contain references which are "woefully out of date". The exception is work which is seminal; for example, all work which uses grounded theory will refer to the 1967 work of Glaser and Strauss.

Should one set boundaries for the search?

One of the reasons for analyzing the concepts involved in one's topic is to ensure that you are casting your searching net sufficiently widely. If for example, in the "quality assurance in distance learning in higher education", your search string had been "quality assurance" and "distance learning" *and* "higher education", you might have got very few results.

The topic will therefore be the main tool for setting boundaries in one's research, but there are others if the amount of citations is likely to be unwieldy. One is to review a particular type of literature – for example only to look at research-based articles and not at grey literature.

You can also limit your search by date. It is obvious that whatever limiting criteria you choose should not be arbitrary, but should make sense in terms of the research. You will need to explain and justify your decision.

How long should you search for?

While you are still finding divergent views and new information, your search should continue. If on the other hand you are not finding anything new, then this will be the time to stop.

Analyzing and synthesizing the literature

Steane (2004) suggests that there should be two stages to the literature review:

1. When you trawl through, and analyze, the articles you have identified,

2. When you actually write up the literature review.

While both processes of review should be critical, the former will deal with items on an individual basis, whereas the latter will compare and contrast: in other words, synthesize.

The following are appropriate headings for evaluation (although Moustaghfir's criteria quoted above could also be applied). You should not be afraid to criticize any shortcomings.

1. Aims and objectives.
2. Central thesis.
3. Outcomes.
4. Theoretical framework.
5. Context and background.
6. Research design and method.
7. Findings.
8. Contribution to the field.

Note that many supervisors encourage students to start writing early in order to get into practice and avoid later writer's block. To do a short piece of writing based on the above criteria for each paper can be a useful exercise.

Between the first and second stages, there should be a process of selection: not everything you read will go into your final literature review. You should only include that which is relevant to your research topic. It may be tempting to have a very long list of references, but examiners will only get annoyed by a lengthy literature review which includes citations of little relevance.

There should also be a stage when you look at the overlap between studies, when you compare and contrast and recognize patterns. This will help you towards your synthesis of literature: you know what you are going to include and why, and can now write your overview.

This overview should:

1. Identify the key contributions in the field,

2. Recognize the main debates and theoretical positions,

3. Categorize studies by their assumptions and approaches,

4. Point out gaps in knowledge and weaknesses in theoretical or empirical positions, and

5. Above all state the ways in which your own contribution fits into the picture.

Structuring and writing the literature review

Once you have an overview of the literature, you are ready to begin writing. In this section, we shall look at the position of the literature review, how it should be structured, and the style you should use to write it.

The literature review chapter is in a pivotal position, after the aims and objectives but before the actual description of the research. The actual research question is likely to come out of the literature review. Sometimes, discussion of the literature takes place over several chapters, for example the methodology chapter might contain some discussion of different research approaches.

The structure of the literature review

There are a number of ways of structuring the discussion of the literature. Steane (2004) recommends a dialectical approach, in which different views and theoretical debates are compared and contrasted. This may work if your area is one where there are strongly divergent views, and you should always show awareness of different perspectives.

Another possible approach is to use the aims and objectives in your introduction, or a pilot study you have done as early research, to provide topics. Type of research may provide another option, for example academic versus practitioner. As with any piece of writing, make sure that your structure is clear by explaining what you are going to do, and using appropriate headings.

It may be carping to suggest that the review would have been even clearer if the middle section, "Results and discussion", had a separate level of heading for the different aspects of the main categories of knowledge, attitudes etc.; as it is the overall structure is not always clear.

Always make sure you relate your discussion to your own piece of research, and in particular to your own research question, which may well have come about through a gap you have identified in the research.

Writing a literature review

Always use an accepted bibliographical convention for in-text references to citations, for example the Harvard system and APA system where the work is only identified by the author's name and the date, with full references at the end, or the Vancouver system, where references are identified by numbers and listed in full at the end. Check which system is preferred by your department or journal for which you are writing, and make sure you know how to use it consistently.

Your writing style should be objective, balanced and dispassionate. For example the word "critical" may lead some to believe that they can be negative. Others, however, and particularly those from cultures which promote deference to the teacher, may feel intimidated by the thought of being critical.

Writing a good literature review demands a lot of work. First comes the slog through the databases and the trawl through articles. After initial impressions are formed, there is the process of selection: what is relevant? And how can I sum up and synthesize?

The most important task of any review which relates to original research, is always to consider not only, "how does it relate to my research?", but also, "how does it create space for my research?" It is only by familiarizing oneself with the literature that one can discover the important questions which remain to be asked, and hence one's own contribution to the field.

Methodology

Description of the Method

The method that was used to collect data—including the sample, assessment instruments, and procedures—should be described with the utmost precision. From this description, the reader should know exactly what was done, to the point where the reader could replicate the study and, presumably, get similar results.

More generally, the design of the study should be clear. In particular, the researcher should state whether qualitative or quantitative methods (or both) were used and what particular research traditions were followed—for example, whether the study was a grounded theory study, a longitudinal study, a survey, case study, comparative study, a single-group time-series study—or perhaps some combination of approaches.

Qualitative researchers also engage in reflexivity: Because their data collection has inevitably been influenced by their own assumptions and values, they openly acknowledge their biases and speculate on how these may have affected what they did, what data they collected, and how they interpreted their results.

Research methodology section describes the methods and procedures used to carry out the study. This is an important section, which has direct influence on the findings of the study. Hence, the methodology used should be described very clearly so that another researcher can follow the procedures used to reach similar conclusions without difficulty.

The chapter should show clearly type of study, population, sample (if any), methods of data collection and types of data to be collected. It must show how data will be analyzed for interpretations. Generally Methodology chapter must be able to answer all the research questions and if it can't do so it is useless for such a particular study.

The methodology chapter should include the following subsections:

Introduction

The chapter should start with a brief introduction highlighting the general methodology and organization or structure of the chapter.

Research Design

In this section, the researcher should identify, define, and provide justification for the specific research design or strategy used in carrying out the study. Research designs include experimental, quasi-experimental, correlational, causal-comparative, action research, survey, case study or historical.

In descriptive studies, survey or case study, the emphasis is placed on defining the design, revealing its merits and providing justification for its selection. In experimental or quasi-experimental studies, the tests, equipment and control conditions should be described. The researcher should also define the dependent and independent variables studied, the procedures

used to examine the variables and steps taken to control for extraneous influences that might threaten the findings of the study.

Research design is about how you go about answering your question: what strategy you adopt, and what methods do you use to achieve your results. In particular you should ask yourself:

Where will your study be conducted, and what type of study?

What is the operational setting of your study, i.e. are you locating it within a particular context such as an organization?

Are you conducting an exploratory study, obtaining an initial grasp of a phenomenon, a descriptive study, providing a profile of a topic or institution?

Or it can be explanatory**,** examining the causal relationship between variables: this can include the testing of hypotheses or examination of causes:

What research methods will you be using?

Methods are "a systematic and orderly approach taken towards the collection and analysis of data so that information can be obtained from those data" (Jankowicz, 2000: 209), whereas techniques are "particular, step-by-step procedures which you can follow in order to gather data, and analyze them for the information they contain" (Jankowicz, 2000: p. 211). The main research methods are:

-Experiment, Survey, Case study, Grounded theory, Ethnographic and observation and Action research.

Note it is possible and indeed desirable, to use more than one method: this is called triangulation and has the benefit of being able to enhance the validity of the results.

Over what time period will your research take place?

Should the research be a "snapshot"/cross sectional, examining a particular phenomenon at a particular time, or should it be longitudinal, examining an issue over a time period? If the latter, the object will be to explore changes over the period.

How large will your sample be? What will your unit of analysis be?

The sample refers to the subset of your population (the total group you wish to investigate). The sample should be sufficiently large to be representative of the population as a whole.

The unit of analysis is the level at which the data is aggregated: for example, it could be a study of individuals as in the women manager studies quoted above, of dyads, as in a study of mentor/mentee relationships, of groups (as in studies of departments in an organization), of organizations, or of industries.

What techniques will you use to collect and analyze the data?

This refers to techniques for the capture and analysis of data**,** such as:

-Interviews (structured and semi-structured).

-Structured questionnaires.

-Observation.

How will you ensure the reliability and generalizability of your research?

Finally, it's important to be aware of four things at all stages of your research; without them, your research will fall flat on its face. These are: Reliability, Validity, Generalizability and Transferability.

Reliability: This is about the replicability of your research and the accuracy of the procedures and research techniques. Will the same results be obtained if the research is repeated?

Validity: How successfully has the research actually achieved what it set out to achieve? Can the results of the study be transferred to other situations? (see also types of validity under case study research**)**

*Generalizability***:** Are the findings applicable in other research settings? Can a theory be developed that can apply to other populations?

*Transferability***:** Can the research be applied to other situations? Particularly relevance when applied to case studies.

Population and Sampling Design

Population

The researcher should identify and describe the characteristics of the population involved in the study. Population refers to the entire group of people, events, or things of interest that the researcher wishes to investigate. Population forms a basis from which the sample or subjects for the study is drawn.

Sampling Design and Sample Size

In this section, detailed description of sampling frame, sampling technique and the actual sample size should be provided.

Sampling methods or techniques may include probability and non-probability techniques. In non-probability sampling designs, the elements in the population do not have any probabilities attached to their being chosen as sample subjects. This means that the findings from the study of the sample cannot be confidently generalized to the population. Typical examples of non-probability sampling techniques include convenience sampling, and purposive sampling.

To ensure fair representation and generalization of finding to the general population, probability sampling technique should be used. Typical examples of probability sampling include simple random sampling, systematic sampling, stratified random sampling and cluster sampling. The sample size should, therefore, be representative of the general population.

Sampling techniques

Sampling may be done either:

-On a probability basis – that is, each member of a given population has an equal chance of being selected, as when your population is the workforce of an organization, and you select members from it:

-On a random basis – a given number is selected completely at random.

This is the most straightforward conceptually, although it is often difficult to achieve a true simple random sample in practice. A simple random sample is one in which every member of the population of interest has an equal chance of being selected for the sample, and every possible sample of size **n** has an equal chance of being selected from the population.
A simple random sample can only be drawn when a sampling frame exists covering the population of interest, and a random number generator is used to select individuals for the sample.

-On a systematic basis – every nth element of the population is selected.

A systematic sample is statistically equivalent to a simple random sample, and generally easier to administer. It depends on knowing the size of the population of interest. A sampling fraction is calculated from the required sample size divided by the population size, expressed in the form 1/**n**. A random number between 1 and **n** is generated to give a starting point, then every subsequent **n**th member of the population is selected for the sample.

-On a stratified random basis – the population is divided into segments, for example, in a University, you could divide the population into academic, administrators, and academic related. A random number of each group is then selected.

Stratified sampling is used when the population of interest comprises several distinct sub-groups, to ensure that the sample contains an adequate number of individuals from every group. The required sample size is divided between these sub-groups, known as strata, then a sample drawn from each stratum to the required size.
Often, the samples drawn from each stratum are proportional to the representation of that stratum in the population, but this does not have to be the case – stratified sampling can be particularly valuable when the population contains a small sub-group from which relatively few members might be selected without stratification, but from which the sample size can be artificially inflated by using a larger sampling fraction. Disproportionate sampling of this sort must be compensated for when estimating parameters for the whole population, by applying appropriate weights to the raw data in the analysis stage.

-On a cluster basis – a particular subgroup is chosen at random.

Cluster sampling is used when the population of interest comprises several similar sub-groups, to reduce the costs of administering the survey. The initial sample drawn is of the sub-groups, or clusters; all members of each cluster can then be surveyed, or a further sample drawn of individual members within each cluster. It is frequently used in population surveys where a restricted number of geographical areas might be targeted, rather than attempting to survey the whole country.

-On a non-probability basis – the population does not have an equal chance of being selected; instead, selection happens according to some factor such as:

-*Convenience* – being present at a particular time e.g. at lunch in the canteen.

-*Purposive* – people can be selected deliberately because their views are relevant to the issue concerned.

Quota – the assumption is made that there are subgroups in the population, and a quota of respondents is chosen to reflect this diversity. A fifth method frequently used in market research surveys is quota sampling. This takes stratified sampling to the extreme, in that a specified number, or quota, of individuals is required from each of a set of often very detailed strata. It is not equivalent to random sampling, although it may be representative of the population, and it is not recommended for academic research.

Some definitions

Population of interest – the whole of the people or objects which are the subject of the research.
Sampling frame – A complete list of the population of interest
Sampling fraction – the proportion of the population which is selected for the sample.
Sample design – the method of selecting individuals from the population for the sample.

Sample size

The answer to "how many do I need?" is almost certainly "less than you might think". Calculation of sample sizes is complex, and depends on the sampling design used, the type of parameters to be estimated, the degree of precision required for those estimates, and the confidence level of the results. Here we shall concentrate on simple random sampling.

Accuracy within +/-	Sample size
5 per cent	384
2.5 per cent	1,537
2 per cent	2,401
1 per cent	9,604

Special considerations

Central limit theorem

There are a number of statistical assumptions in the theory of parameter estimation for proportions. In particular, the sample size (**n**) should satisfy the following inequalities:

(8a) $\mathbf{np} \geq 5$ and $\mathbf{n}(1 - \mathbf{p}) \geq 5$, where **p** is the proportion being estimated

In practice, this means that if **p** = 0.01 (i.e. 1 per cent) then the sample size should be at least 500.

Accuracy of estimation

If **p** = 0.1 (i.e. 10 per cent), then the sample size should be at least 50. However, considerations of the accuracy of the estimate suggest that a larger sample size may be required. Any equation gives a confidence interval of one percentage point either side of a given proportion **p**. If **p** = 10 per cent, then this can be manipulated to give a required sample size of at least 539. A smaller sample size would be sufficient if less accuracy were required in the estimate; 311 would be sufficient for accuracy of 2.5 percentage points either way (i.e. **p** in the range 7.5-12.5 per cent)

$$\mathbf{p} \pm \frac{2.58\mathbf{p}(1 - \mathbf{p})}{\sqrt{\mathbf{n}}}$$

Power considerations

A third approach may be taken by considering the power of tests of proportions. The power of a hypothesis test is a measure of how well it rejects the hypothesis when it is false (whereas the more commonly used significance level of the test relates to how well it accepts the hypothesis when it is true). The theory here is complex, and again a number of assumptions must be made to arrive at a viable sample size figure. It is particularly relevant to the detection of small proportions. It can be shown that if **p**=1 per cent, then a sample size of 380 is sufficient for a power of 95 per cent against the alternative that **p**=0.

Small populations

Where the overall population is small, it may be possible to reduce the sample size without loss of precision

Response rate

It is important to remember that it is not the size of the sample which matters, but the number of responses made. This is what the analysis will be based on, and it will affect the accuracy of any parameter estimates calculated and inferences drawn. Some common analyses have specific requirements below which their assumptions become invalid – the $\mathbf{x}^2$ test, for example, require that the expected values in each cell are greater than or equal to 5. The more complex the table, the larger the sample size needed to meet this criterion.

The response rate you can achieve will depend on a variety of factors – the nature of the population, the type of survey undertaken, the length of the questionnaire, and how easy it is to fill in are just some of these. There are also actions you can take to improve the response rate, for example:

-making questionnaires attractive and easy to complete

-booking interviews at a mutually convenient time

-offering an incentive, such as a prize draw from responses received by a given date

-issuing a general reminder shortly before the closing date

-Following up individual non-respondents after the closing date and offering an extension. Where each of these (if any) might be appropriate, will depend on the individual circumstances of each survey.

The likely response rate should be built in to the initial calculations of sample size. It may seem easy to select a large sample in the first instance, and not worry about response rates. However, the danger is that only those with a particular point of view may respond, and the survey will thus give a biased result. It is not generally possible to clean any information about the non-respondents to a survey, although if you have independent information about the population you can compare this to the survey results. If the survey attracts a low response, it may also be useful

to compare the responses received at different times during the survey process, to see if any trends in key measures can be observed which might affect the outcomes of the research.

Data Collection Methods

In this section, the researcher should describe the major methods for collecting data from the subjects. The major methods for obtaining data in a study may include interviews, questionnaires and observation techniques. The data collection instruments should be developed and organized on the basis of the research questions or specific objectives to ensure relevance to the research problem. A description of the instruments should be given, whether they are researcher developed or standardized instruments. A description of the nature of instrument items, validity and reliability, and administration procedures should be provided.

Methods of empirical research

First, however, it is important to distinguish quantitative and qualitative approaches to data collection:

Inductive and deductive approaches

At what point in your research you bring in a theoretical perspective will depend on whether you choose an:

-*Inductive approach* – collect the data, and then develop the theory.

-*Deductive approach* – assume a theoretical position then test it against the data.

It should be emphasized that none of the above approaches are mutually exclusive and can be used in combination.

Main data collection methods used in empirical research

Experiment – an experiment involves deliberately testing a hypothesis and reaching a conclusion, by creating a situation where one of the variables is manipulated: It is testing what happens to one variable (usually called the independent variable) when another variable (usually called dependent) is removed or altered. It starts with a hypothesis, and then tests it, analyzing the resultant data and reporting the findings.

Survey – This method involves collecting a large amount of data from a large population, most usually by questionnaires or structured interviews. Most usually it is a quantitative method, involving "closed" questions with a predetermined number of answers. These are in fact much easier to fill in and therefore more likely to get a high response rate, as does keeping the questionnaire short. It's a good idea to trial the survey to ensure ease of completion and lack of ambiguity.

Case study – These are much used in business research, and involve looking at a particular set of issues in a particular context in a particular organization or part of an organization.

Ethnographic and observational methods – As the term suggests, this has its roots in anthropology and requires involvement in the setting of the research. Various forms of observation are much used in management research, although they can be time-consuming. It is most usually a qualitative method, although it can be used quantitatively if highly structured. It is often done at exploratory stages of research. It is particularly useful when watching people interacting with something, for example students interacting with learning material, people interacting with their environment in a shopping precinct or leisure centre.

Grounded theory – This is a research approach where there is an initial observation with minimal preconceptions followed by the generation of a hypothesis, theory or prediction, which is then further tested. Its use of data is therefore iterative, with theory being grounded and refined as further data is sought. As a method it is initially inductive, but can become deductive at a later stage.

Action research – This occurs in situations where people are ostensibly reflecting on their own work and self-consciously trying to improve practice and performance. There will here be close collaboration between the practitioner and the researcher, and a strong focus on change.

How to collect data

Designing a data collection instrument

The general principles of good research practice apply to data collection methods as to any other area of research. Before you embark on any survey or other data collection method, you should consider:

-Whether the data you seek are already available from an existing source.

-What is the most appropriate method (e.g. questionnaire, interview, observation, secondary data or archival) or combination of methods?

-The practicalities of carrying out the data collection (what, how, when, where, by whom…?)

-How the data will be prepared for analysis (e.g. data entry procedures, coding).

The need for a formal instrument

Whatever methodology you use, you will need a formal instrument to administer the data collection. The design details of a self-completion questionnaire will differ from those of an interview schedule or observation record, but the overall principles are the same. The following is based on a self-completion questionnaire; relevant principles can be applied to any data collection methodology.

Relate to your research questions

For each question that you want to include in your instrument, consider:

-Why do I want to know this?

-Which of my research questions does it address?

-What will I do with the data – how will I analyze and report them?

Include all those questions which are relevant and useful, and omit those which are unnecessary or repetitive.

Quantitative or qualitative data

The process of quantitative research is linear: the researcher will start out with a theory, design a research process, collect data, analyze it and then review findings to see whether or not they support the hypothesis suggested by the theory.

In qualitative research, the process is much more iterative and inductive. The researcher will start out with a question or issue, collect data, and analyze the data they have collected, start to formulate theory, go back and look at, or even collect, and more data.

With quantitative research, the researcher will normally decide on the method of analysis, including statistical technique, before even data collection starts. In qualitative research, however, the process is a lot more messy, and it's common for the theory, design, collection and analysis phases to overlap. In qualitative research, sticking with the original research design can be a sign of inadequate data analysis, not consistency." (Silverman, 2004, p. 152)

Nor can everything be transformed to numbers, as with quantitative data. There is no common ground, and the researcher will amass large amounts of data in many different forms. Analysis therefore needs to begin with the data in its raw state, acknowledging that it may have come from various different methods of collection such as interviews, focus groups, documents, or images.

Each piece of data, then, needs to be approached in its own terms, and meaning extracted – which may need to be negotiated throught the lens of the cultural context in which the author is operating.

This is a key consideration. Quantitative data are not just measures with numerical values (e.g. age, income) but any data which relate to the quantity of the measure concerned. Quantitative data can be analyzed in a variety of ways, using spreadsheet functions or specialist statistical packages.

Qualitative data are not amenable to automatic numerical analysis. Specialist packages are available to assist in analyzing such data; these are not considered here. There can be considerable value in qualitative data, and most surveys will include at least one opportunity for respondents to make open ended comments.

However, it is useful to briefly remind ourselves here, before we go on to look at the detail of data analysis, of the principles covering data collection.

Qualitative data divides broadly speaking into two main categories:

1. That which is collected by the researcher, through interviews, focus groups, or ethnographic field observation.

2. That which exists in data form prior to the research – for example, public documents, statistics, e-mails, etc.

The second category of data will have already been recorded so will not present major challenges with regard to collection and management. We therefore concentrate here mainly on issues with regard to the former category.

Interviews

There are two views of interviews, and which you take will depend upon, and affect, the status of the data which you end up with – whether you believe you have objective facts about the world, or subjective perceptions or narratives. Which view you take will affect how you structure the interview:

-The positivist view maintains that interviews give data which are 'facts' about the world. To collect this sort of data, it is best to ask questions in standard format, worded in the same way, which will enable you to quantify the responses.

-The constructionist, emotionalist view maintains that interviewees construct their own, more subjective view of reality, their own narrative of events. This type of data is best collected by unstructured, open ended interviews.

It is almost always better to record interviews and to work from transcripts, for two reasons:

1. It is not always possible to rely on one's memory of conversations.

2. Tapes constitute a public record, which cannot be disputed, and which can if necessary be reanalyzed by others, with different questions/theories in mind.

Field notes

Collecting data in the field, for example in the course of participant observation, is a highly skilled business. You are not merely making a record, but interpreting what you can see and hear, so that you are collecting and analyzing data at the same time:

-Your notes made at the time, which will necessarily be brief

-Expanded notes made as soon as possible after the observation

-A field work journal which looks at problems and ideas

-A 'running record' of analysis and interpretation

Silverman (2004), based on Spradley, states: "Memos or contact sheets made after each observation, covering people, events, situations, themes, interpretations, research questions, hypotheses, and suggesting the focus of the next observation."

Silverman (2004), based on Spradley and Miles and Huberman, states: "It is common for researchers to record what they hear and not what they see, although the latter is very important – the layout of a shop or restaurant, the size of workspace in an office, the care taken (or not) to avoid hazards in a factory etc."

Some general principles for managing data

You need to record all your data in an organized way so that you have an audit trail of:

-When it was collected

-In what form, i.e. document, interview, etc.

-What it refers to, i.e. person, company, etc.

Data should also be reliable: it should form an accurate a record as possible. See above notes on using transcripts, and also making notes as you observe (short) and as soon as possible afterwards.

Finally, you need to retain all your notes, transcripts etc. so that you have a complete record of all your research. This is important whether you are preparing an undergraduate student dissertation, a doctoral thesis, or a report for funded research.

Research Procedures

A detailed description of the steps taken in the conduct of research should be provided for the purposes of replicability. The researcher should provide a complete account of the research process including the design and development of the instruments, pilot testing, administration of interviews or questionnaires in terms of scheduling of the subjects or participants, distribution and collection of the instruments and the running of the experiments. Procedures may also include timing of interviews or questionnaires and instructions given to subjects.

Data Analysis Methods

The researcher should identify and describe appropriate data analysis methods for the study. Quantitative approaches in terms of descriptive statistics or inferential statistics should be described. Descriptive statistics include frequencies, measures of central tendencies (mean, medium or mode) and measures of dispersion (standard deviation, range or variance) while inferential statistics involve measurement of relationships and differences between or among the variables. Inferential statistics include correlation, regression analysis and analysis of variance among others.

Data analysis tools in terms of computer application packages (Excel, Minitab, Starta SPSS or SAS) should also be described. Data presentation methods in terms of tables, graphs or charts should also be described in this section. Qualitative data should be summarized and categorized according to common themes and presented in frequency distribution tables.

Techniques of data collection and analysis

First, it is necessary to differentiate between two different types of data:

Structured data is highly organized, and can easily be coded and analyzed using statistics.	*Unstructured data* is disorganized, often generated by open questions, observation etc. and requires work before coding.
Collected by structured techniques.	Collected by semi-structured techniques.

Structured techniques

These present a series of questions with a choice of pre-set alternative answers.

Questionnaires – are used frequently in survey research, and can be printed and sent out by post, done over the telephone, or increasingly over the Internet. They represent an economical way of contacting a large number of people. Very often, they will be used to collect highly structured data and use closed questions (yes/no, choice of boxes e.g. for age, or Likert scale). (To achieve a higher response rate, make the questionnaire short and easy to fill in.)

The returned questionnaires should be read and the responses recorded as percentages.

Repertory grid – This is similar to the questionnaire using a Likert rating, but the person/institution interviewed is involved in the design of the questionnaire.
Structured interview – this will use a series of identical questions for each respondent. This will proceed according to a written guide but will also contain directions as to sequence, and possibly explanations of certain terms.
Structured observation – this is usually either effected by a machine (for instance, EPoS which tracks product sales) as opposed to a human, or by means of time-sampling, i.e. the observation of phenomenon over a particular period of time.

Analysis of structured data

Because the data conforms to a series of pre-set categories, it can be coded using symbols (usually numbers but occasionally letters). Analysis is usually done by statistics. The two main forms of statistical analysis are:

-*Descriptive* – the statistics will either be used to reveal patterns and show differences among variables.

Inferential – the statistics will be used to draw conclusions, explain cause and effect, and make predictions. Here, the researcher is interested in the relationship between dependent variables (whose score depends on or is affected by another variable) and independent variables (who determines the score of a dependent variable).

It is best to enter the data onto a spreadsheet such as Excel, and then use a statistical package such as SPSS or Minitab to carry out the analysis.

Semi-structured techniques

These all allow for responses which do not conform to a set pattern.
Interviews – these may be:

-*Semi-structured* – This is where you have a "theme" for your interview, and some carefully defined questions, but leaves open the possibility of discussion of other cognate areas.

-*Key informant* – there may be several people who are key to your research, whom it will be important to interview to gain key information about the project. This may be used at an exploratory stage of the research, when the issues are being identified.

Focus groups – in this technique, a group of people are deliberately assembled to discuss an issue, and the discussion recorded and then analyzed.
Unstructured observation – while some software packages can be used, more traditional forms of data capture include notes, reports, and diaries (from the participants).
Conversations – This refers to situations when you talk informally to people about your research topic, for example during visits to an organization you are investigating you may find yourself in conversation with people whom you didn't plan to interview. You may be able to steer them informally towards topics relevant to your research.

Analysis of unstructured data

This will be more difficult, though not impossible, to code, and a key skill involves exploring the data for patterns, concepts and themes. A common technique for analyzing unstructured data is content analysis. This involves analyzing the content according to particular categories. The stages are to first determine the categories, then define them and provide key indicators, i.e. phrases in the material which would indicate the category. It is also important to determine the unit of analysis, which may be the word, the sentence or the paragraph.
Content analysis is often used for printed material and websites, which we have not discussed in these pages, but which can provide important secondary sources.

Note it is possible and indeed desirable, to combine qualitative and quantitative data techniques: this strengthens the analysis and makes for a richer picture.

Coding and analysis

It is advantageous to consider how you will code and analyze the data collected during the design stage of your project. A little care at this stage will pay dividends later!
If you can predict the likely answers to a particular question or if there is a fixed set of options in which you are interested, then, list these with a series of boxes to tick – such data are much easier to analyze and interpret than open ended answers. An “Other” option can be included;

although the data gathered from this will generally be incomplete and of little value in practice, it will cover any major areas which you may have forgotten, and allow respondents who are particularly keen to add extra information which may be of interest.

If the range of answers is likely to be extensive – for example you wish to know the respondent's age – then an open ended question may be preferred. The point at which a series of tick boxes (or equivalent) becomes counter-productive may depend on the format of your questionnaire – for example a web-based questionnaire asking for month of birth could have a drop down menu from which to select, whereas the same question on a paper-based survey might be open-ended, rather than listing all 12 months with tick boxes.

Using tick boxes rather than open ended questions can also help to direct respondents to an appropriate answer level

You should also consider whether the options listed for tick box responses are mutually exclusive or whether several answers could be marked. These require different coding schemes and analysis methods.

If responses are recorded on paper, and require manual data entry, it may be helpful to indicate the coding and/or column reference for each question in a small typeface on the questionnaire.

Open ended text questions can be post-coded for analysis, analyzed manually, or a specialist text analysis package could be used.

Variable types

Quantitative data can be divided into four broad categories. The analyses which you can (legitimately) perform will depend on the data type. In order of complexity, these are:

-Categorical, Ordinal, Interval, Ratio

Categorical: Categorical data are descriptive variables which allocate subjects to categories which have no inherent order e.g. gender; country of origin. Note that categorical variables may be represented by numerical values in the data set; this does not change their type. Categorical data are commonly used to describe the data set, and to provide sub-divisions for analysis and comparison.

For categorical variables, the measure of position (average) is the mode (the most frequently occurring value).

Ordinal: Ordinal data are descriptive variables which allocate subjects into categories with a natural order – e.g. satisfaction ratings; frequency categories. Ordinal variables are often represented by numerical values in the data set; this does not change their type, and particular care must be taken.

In some instances, particularly when analyzing items from Likert (rating) scales, ordinal variables may be assumed to be interval variables for analysis purposes.

For ordinal variables, the measure of position (average) is the median (the value where half the respondents are above, and half below). The measure of dispersion is the range (maximum minus minimum value).

Interval: Interval variables are those where there is a constant spacing between the values. These are usually numeric, e.g. expenditure; age; temperature; height; number of articles published – e.g. the difference in temperature between 15 and 30 degrees is the same as the difference in temperature between 30 and 45 degrees. In practice, interval variables are generally recorded only in specialist areas, and the majority of numeric variables are ratio variables.

For interval variables, the measure of position (average) is the arithmetic mean. The measure of dispersion is the variance or standard deviation.

Ratio: Ratio variables are interval variables where there is a clear definition of zero, meaning an absence of the item being measured e.g. expenditure; age; height; number of articles published. In practice, the vast majority of numerical measures are of this type. Temperature in degrees centigrade, for example, is not a ratio variable, as a temperature of 0°C is not the same as an absence of temperature.

Further, it is meaningful to discuss ratios for ratio variables (as their name implies) – e.g. someone who earns £30,000 per annum earns twice as much as someone earning £15,000 per annum. Ratios have no intrinsic meaning for interval variables – a day with a temperature of 20°C is not twice as hot as one when the temperature is only 10°C.

For ratio variables, the measure of position (average) is the arithmetic mean. The measure of dispersion is the variance or standard deviation.

Changing a variable's type

It is always possible to reduce a variable to a lower status – a ratio or interval variable can be coded into an ordinal variable; and an ordinal variable can be analyzed in the same way as a categorical variable, if required.

Entering and cleaning up the data

Once you have collected your data, you need to get it into a form where it can be analyzed. This initially involves entering the data into any software like spreadsheet, after which you will need to carry out some basic checks.

Accuracy of data entry

Once you have entered your data into a spreadsheet or analysis package, it is essential to carry out some basic checks before you begin your main analysis.

If the data have been collected automatically, e.g. from a web-based questionnaire, this is not usually a problem. However, you should still check for duplicates (particularly where an incentive has been offered to participants). If the data have been entered manually, then some quality control measures should be incorporated into the data entry process.

It is always valuable to carry out a simple distribution analysis, showing how many respondents have marked each answer to each question. This will pinpoint any coding errors where out-of-range codes might have been entered, and highlight any unusual values.

Detecting outliers

In some analyses, outliers – individual values which are particularly high or low – can materially affect the results. In such cases, it may be desirable, and legitimate, to omit these from the analysis. Detecting them is largely subjective – a plot of the data distribution is usually adequate to spot extreme values. A more objective test is to examine as a possible outlier any value which is more than 3 standard deviations from the mean of the distribution. Outliers may be indicative of errors in the data or of a typical individual in the population.

Dealing with missing values

Many statistical packages will automatically exclude blank responses within numerical data from the analysis as being "missing". If a blank response should not be regarded as missing, it will usually be necessary to recode it, e.g. to zero. You can also specify set values to be treated as missing – for example if you have coded "don't know" = 99 as a valid response. Zero values will not generally be treated as missing by default, nor will blank values in text fields.

If a respondent has clearly not answered most of the questions, but given up well before the end, the best option may be to omit that respondent from the data set entirely.

In some circumstances it may be necessary to include cases with missing values in the data set for certain analyses; the usual procedure in such cases is to replace the missing value by the mean of the remainder of the data.

How to analyze qualitative data

"Researchers need to focus on ways in which the actors order their own world, and avoid counting everything." (Silverman, 2004, p. 181)

This sums up two ways in which the approach to data differs in qualitative research from that generated by quantitative investigation. The researcher is not dealing with numbers which can be crunched; neither is he or she is dealing with an absolutely literal interpretation of the world. Instead, the researcher needs to use intuition, imagination and interpretation.

An ethnographic view of data: negotiation of meaning

In the scientific view, which is the dominant paradigm for quantitative research, reality exists independently and data can be collected to represent it. The researcher's task is to structure the data collection process so that the data represents the truth. For example, if the researcher wants to find out the most important factors sought in a washing powder, they need to formulate the questions in such a way that all the possibilities are catered for.

The collection and analysis of qualitative data, however, is dominated by the ethnographic paradigm. Ethnographers are concerned to interpret data according to the social world of their participants. Organizations, for example, have their own value systems which will be reflected in the language and the images used both by individuals and in collective statements. For this reason, it is not always possible to take data at face value.

Analyzing as you collect

As we saw in the section on introductory considerations, qualitative research differs from quantitative in being non linear, with the activities of data collection and analysis intertwined. Most researchers advocate starting some coding before all the data comes in, for two reasons:

-You avoid 'drowning in data' – qualitative research can generate voluminous data, and the researcher can be faced with literally 100s, even 1,000s of pages.

-You get to develop your analysis – concepts and themes start to emerge, and if you have decided to use a particular method, such as content or discourse analysis, you have a chance to see how that will work, and whether it might be better to adopt another approach.

Thus when you get a certain way through your collection, say after the first few interviews or first major site visit, you could make your initial analysis. The next section, carrying out the analysis, goes into more detail on methodology.

Carrying out the analysis

In this section, we shall look in general terms at the process of analysis, and the techniques used. Qualitative researchers often use specific methods, such as content analysis, narrative analysis, grounded theory, etc., and we shall be examining these in greater detail in the next section.

Coding

Coding is the heart of the analysis process – once you have your codes, you can start to mark up the texts, transcripts, or whatever you are using, look at emergent themes and subthemes and begin to build theory. These are the main issues you need to be concerned with:

Obtaining a unit of analysis

The first task when you have your sample is to consider how you are going to break the text down: what will your unit of analysis be? There are a number of possibilities:

-research sections: whole interviews, responses to interview questions

-Grammatical: sentences, paragraphs, etc.

-formatting: lines, page

-thematic: themes, ideas

Finding themes and concepts

First of all, you will need to become thoroughly familiar with your material. Certain key ideas, patterns, themes etc. will probably begin to emerge as you collect your data – remember, collecting and analysis can be parallel activities.

You can familiarize yourself with the material by studying it in different ways – for example, not just reading it line by line, but also dipping in and out, looking at what isn't there – for example, pauses, questions avoided etc.

The process of coding occurs when you translate the key ideas into more abstract concepts, which will become your coding variables, or the labels for the phenomena occurring in the text. For example, you may be interviewing people about their response to a restructuring, and a

recurrent theme may be fear of an increasing workload. You will need to give these variables code names, whilst remaining aware of subtle but significant differences, and distinguishing them in the coding (for example, fear of increased workload could be "fear work", fear of longer hours could be "fear hours").

The above process is known as open coding – the categories are allowed to emerge from a detailed scrutiny of the data. The next stage is to look at the relationships between the codes that label the categories, for example, you could look at cause and effect. Thus in the above example, the cause of fear (of increasing workload/longer hours) may be belief that the restructuring may involve fewer staff. This is known as axial coding. (You can also use graphical techniques, for example, mind maps, influence diagrams, or logic diagrams, to look at relationships between codes.) Finally comes selective coding – when the researcher tries to find the 'story', and looks for core categories and fits other things round them.

Sometimes, researchers prefer to use a more structured approach than that outlined above, taking a particular set of concepts from the literature, particularly if they are up against time pressures (as in a student project). Content analysis is one example of where this is done.

Building a code book

This is an organized list of codes, as a reference. There are a number of ways of developing this; one is to include:

-a detailed description of each code

-inclusion and exclusion criteria

-examples, with real text (if a code is particularly abstract, you could include examples of what it does not include)

Needless to say, if there is more than one researcher on the project, the codes need to be agreed between them.

Marking the text

Once you have your codes, you are ready to start marking the text. You can tag (which can be done with software) particular bits of text for later indexing. You can also mark the codes manually against your transcript, for example having a separate column for the codes.

Theory building

Once you begin to see the relationships between codes, you begin to identify a pattern, which can form the basis for a theoretical model.

Once the model is constructed, it should be constantly tested, particularly against cases which disprove it. This is the essence of the iterative, cyclical nature of qualitative research. Many researchers use a method derived from Kolb's learning cycle, where reflexion, conceptualization and experimentation follow experience, i.e. data: As you get ideas on the theory, write memos to yourself – these could be just keywords on postits or longer documents outlining a particular thesis.

Using software

Researchers have been using software for qualitative analysis since the 1980s, with specific programmes being developed by the mid-1990s and rapidly becoming more and more sophisticated. The difference between this software, known as Computer-Assisted Qualitative Data Analysis Software (CAQDAS) and the software programmes used in quantitative research – SPSS etc. – is that they cannot actually carry out the analysis. However they can help you manage the data more efficiently and it is here that they are probably most valuable.

These are some of the things that CAQDAS software can help you with:

-Making notes, writing up, editing, and writing reflective commentaries (memos).

-Storing data – it can be very helpful, given the amount of data which you will probably collect, to have it all brought together.

-Indexing and retrieving – themes are identified, grouped so that categories emerge, then you can tag the relevant text, and compare same-tagged texts.

-Seeing the bigger picture – it can provide pictorial representations of data.

-Linking – connecting relevant data.

However, the drawback is that it takes some time to learn the software, so you need to ensure that your research project is large enough to justify the opportunity costs, not to mention the actual cost of the software.

Assessing your analysis

How do you know when you have completed your analysis, and then how do you know that it is reliable, valid and generalizable?

Completion

Because of the more open ended nature of qualitative analysis, it can be more difficult to know when analysis is complete. The main (and unquantifiable) ways of knowing are:

-When analysis no longer adds anything new

-When you have answered the question you set out to ask.

Some specific analytic techniques

In this section we shall look at some of the specific techniques which researchers use to analyze qualitative data. Note that these methods are not mutually exclusive and can be combined.

Grounded theory: As its name implies, grounded theory involves grounding the analysis in the experience that provides the data, whether this originates from interviews, participant observation, or other method. A sample of text of transcripts or notes are read closely, and emergent themes noted in a process known as open coding (seen earlier), with a view to understanding the issues which are most important to the research subjects. The data is approached with the minimum of preconceptions and the literature is often only studied after initial theory building has begun.

As categories emerge, these are built into theoretical models, more data may be collected, and the findings compared with the literature. A variety of methods are used including the constant comparison method, which involves comparisons between individual sources of data, and between the data and the literature. This provides useful triangulation.

Grounded theory is thus classic inductive research, in that data collection, analysis and theorizing is iterative.

Content analysis: Content analysis analyses texts by reducing them to a unit by variable matrix, according to a set of variables which have already been isolated. It is particularly useful if a great deal is known about the subject already, and the categories already established. In some instances, themes are quantified and the results expressed statistically**.**

Note, however, that the term "content analysis" can also be used generically to refer to the analysis undertaken for qualitative data, which should more properly be referred to as discourse analysis or narrative analysis.

Discourse analysis: This is one of the main methods used to analyze texts, and involves looking at language in its context, the idea being that particular communities, be they social, disciplinary, cultural or organizational, give language a distinct meaning to describe their experiences. "Discourse" is defined as "[a] set of meanings, metaphors, representations, images, stories and statements which together produce a particular version of the world" (Bergland and Johansson, 2007, quoting Foucault (1993), Laclau and Mouffe (1985) and Burr (1995).

Narrative analysis: Narrative analysis looks at texts, conversations and interviews as narratives which describe subjects' experiences, the idea being that these narratives are influenced – and modified – by social processes.

Conversation analysis: This method of analysis looks at dialogue and in particular, the roles and identities taken on by participants (e.g. in student dialogue one student may 'teach' another), often working back from various 'outcomes' such as laughter or a request for clarification.

Analytic induction: This involves rigorous testing of a hypothesis. As such, its importance in qualitative research is that it can increase rigour, and is therefore valuable in theory building.

Semiotics: A method which looks at the culturally determined meaning encoded in signs and symbols.

Hermeneutics: A method, originally developed to study the Bible, used to analyse texts, often used to examine documents in general.

Analysis of Quantitative data

How to choose the right statistical technique

Start to think about the techniques you will use for your analysis before you collect any data.

It is well worth spending a little time considering how you will analyze your data before you design your survey instrument or start to collect any data. This will ensure that data are collected – and, more importantly, coded – in an appropriate way for the analysis you hope to do.

What do you want to know?

The analysis must relate to the research questions, and this may dictate the techniques you should use.

What type of data do you have?

The type of data you have is also fundamental – the techniques and tools appropriate to interval and ratio variables are not suitable for categorical or ordinal measures

What assumptions can – and can't – you make?

Many techniques rely on the sampling distribution of the test statistic being a Normal distribution. This is always the case when the underlying distribution of the data is Normal, but in practice, the data may not be normally distributed. For example, there could be a long tail of responses to one side or the other (skewed data). Non-parametric techniques are available to use in such situations, but these are inevitably less powerful and less flexible. However, if the sample size is sufficiently large, the Central Limit Theorem allows use of the standard analyses and tools.

Techniques for a non-Normal distribution

Parametric and non-parametric statistics

Parametric methods and statistics rely on a set of assumptions about the underlying distribution to give valid results. In general, they require the variables to have a Normal distribution.

Non-parametric techniques must be used for categorical and ordinal data, but for interval & ratio data they are generally less powerful and less flexible, and should only be used where the standard, parametric, test is not appropriate – e.g. when the sample size is small (below 30 observations).

Central limit theorem

As the sample size increases, the shape of the sampling distribution of the test statistic tends to become Normal, even if the distribution of the variable which is being tested is not Normal.

In practice, this can be applied to test statistics calculated from more than 30 observations.

How much can you expect to get out of your data?

The smaller the sample size, the less you can get out of your data. Standard error is inversely related to sample size, so the larger your sample, the smaller the standard error, and the greater chance you will have of identifying statistically significant results in your analysis.

Basic techniques

In general, any technique which can be used on categorical data may also be used on ordinal data. Any technique which can be used on ordinal data may also be used on ratio or interval data. The reverse is not the case.

Describing your data

The first stage in any analysis should be to describe your data, and hence the population from which it is drawn. The statistics appropriate for this activity fall into three broad groups, and depend on the type of data you have.

What do you want to do?	*With what type of data?*	*Appropriate techniques*
Look at the distribution	Categorical / Ordinal	Plot the percentage in each category (column or bar chart)
	Ratio / Interval	Histogram Cumulative frequency diagram
Describe the central tendency	Categorical	n/a
	Ordinal	Median Mode
	Ratio / Interval	Mean Median
Describe the spread	Categorical	n/a
	Ordinal	Range Inter-quartile range
	Ratio / Interval	Range Inter-quartile range Variance Standard variation

Descriptions of the main graphical techniques

Mean – the arithmetic average, calculated by summing all the values and dividing by the number of values in the sum.

Median – the midpoint of the distribution, where half the values are higher and half lower.

Mode – the most frequent occurring value.

Range – the difference between the highest and lowest value.

Inter-quartile range – the difference between the upper quartile (the value where 25 per cent of the observations are higher and 75 per cent lower) and the lower quartile (the value where 75 per cent of the observations are higher and 25 per cent lower). This is particularly useful where there are a small number of extreme observations much higher, or lower, than the majority.

Variance – a measure of spread, calculated as the mean of the squared differences of the observations from their mean.

Standard deviation – The square root of the variance

Differences between groups and variables

Chi-squared test – used to compare the distributions of two or more sets of categorical or ordinal data.

t-tests – used to compare the means of two sets of data.

Wilcoxon U test – non-parametric equivalent of the t-test. Based on the rank order of the data, it may also be used to compare medians.

ANOVA – Analysis of variance to compare the means of more than two groups of data

What do you want to do?	*With what type of data?*	*Appropriate techniques*
Compare two groups	Categorical	Chi-squared test
	Ordinal	Chi-squared test Wicoxon U test
	Ratio / Interval	t-test for independent samples
Compare more than two groups	Categorical / Ordinal	Chi-squared test
	Ratio / Interval	ANOVA
Compare two variables over the same subjects	Categorical / Ordinal	Chi-squared test
	Ratio / Interval	t-test for dependent samples

Relationships between variables

The correlation coefficient measures the degree of linear association between two variables, with a value in the range +1 to -1. Positive values indicate that the two variables increase and decrease

together; negative values that one increases as the other decreases. A correlation coefficient of zero indicates no linear relationship between the two variables. The Spearman rank correlation is the non-parametric equivalent of the Pearson correlation.

What type of data?	*Appropriate techniques*
Categorical	Chi-squared test
	Chi-squared test
Ordinal	Spearman rank
	correlation (Tau)
Ratio / Interval	Pearson
	correlation (Rho)

Note that correlation analyses will only detect linear relationships between two variables. However, the correlation for the second data set, where the relationship is not linear, is 0.0. A simple correlation analysis of these data would suggest no relationship between the measures, when that is clearly not the case. This illustrates the importance of undertaking a series of basic descriptive analyses before embarking on analyses of the differences and relationships between variables.

Testing validity

Significance levels

The statistical significance of a test is a measure of probability - the probability that you would have obtained that particular result of the test on that sample if the null hypothesis (that there is no effect due to the parameters being tested) you are testing was true.

In general, any level of probability above 5 per cent ($p>0.05$) is not considered to be statistically significant, and for large surveys 1 per cent ($p>0.01$) is often taken as a more appropriate level.

Note that statistical significance does not mean that the results you have obtained actually have value in the context of your research. If you have a large enough sample, a very small difference between groups can be identified as statistically significant, but such a small difference may be

irrelevant in practice. On the other hand, an apparently large difference may not be statistically significant in a small sample, due to the variation within the groups being compared.

Degrees of freedom

Some test statistics (e.g. chi-squared) require the number of degrees of freedom to be known, in order to test for statistical significance against the correct probability table. In brief, the degree of freedom is the number of values which can be assigned arbitrarily within the sample.

For example:

In a sample of size ***n*** divided into ***k*** classes, there are ***k-1*** degrees of freedom (the first k-1 groups could be of any size up to **n**, while the last is fixed by the total of the first ***k-1*** and the value of ***n***. In a two-way contingency table with ***p*** rows and ***q*** columns, there are ***(p-1)*(q-1)*** degrees of freedom (given the values of the first rows and columns, the last row and column are constrained by the totals in the table)

One-tail or two-tail tests

If, as is generally the case, what matters is simply that the statistics for the populations are different, then it is appropriate to use the critical values for a two-tailed test.

For example

t-Test: Paired Two Sample for Means		
	Before	After
Mean	360.4	361.1
Variance	46,547	46,830
Observations	62	62
Degrees of freedom (df)	61	
t Stat	1.79	
p(T<=t) one-tail	0.04	
t Critical one-tail	1.67	
p(T<=t) two-tail	0.058	
t Critical two-tail	2.00	

If, however, you are only interested to find out if the statistic for population ***A*** has a larger value than that for population ***B***, then a one-tailed test would be appropriate. The critical value for a one-tailed test is generally lower than for a two-tailed test, and should only be used if your research hypothesis is that population ***A*** has a greater value than population ***B***, and it does not matter how different they are if population ***A*** has a value that is less than that for population ***B***.

If the above test results were obtained, then under scenario 1, using a two-tail test, you might conclude that there was no statistically significant difference between the scores (p=0.08), and, as a consequence, that training had no effect. Similarly, under scenario 3, you would conclude that there is no evidence to suggest that training causes mean scores to fall, as they have in fact risen. However, under scenario 2, using a one-tail test, you would conclude that there was an increase in mean scores, statistically significant at the 5 per cent level (p=0.04).

A final warning!

Statistical packages will do what you tell them, on the whole. They do not know whether the data you have provided is of good quality, or (with a very few exceptions) whether it is of an appropriate type for the analysis you have undertaken. **Rubbish in = Rubbish out!**

Advanced techniques

These tools and techniques have specialist applications, and will generally be designed into the research methodology at an early stage, before any data are collected. If you are considering using any of these, you may wish to consult a specialist text or an experienced statistician before you start.

Factor analysis: To reduce the number of variables for subsequent analysis by creating combinations of the original variables measured which account for as much of the original variance as possible, but allow for easier interpretation of the results. Commonly used to create a small set of dimension ratings from a large number of opinion statements individually rated on Likert scales. You must have more observations (subjects) than you have variables to be analyzed.

Cluster analysis: To classify subjects into groups with similar characteristics, according to the values of the variables measured. You must have more observations than you have variables included in the analysis.

Discriminant analysis: To identify those variables which best discriminate between known groups of subjects. The results may be used to allocate new subjects to the known groups based on their values of the discriminating variables

Discriminant analysis was used to determine whether statistically significant differences exist between the average score profile on a set of variables for two a priori defined groups and so enabled them to be classified. Besides, it could help to determine which of the independent variables account the most for the differences in the average score profiles of the two groups. In this study, discriminant analysis was the main instrument to classify the benchmarking adopter and non-adopter. It was also utilized to determine which of the independent variables would contribute to benchmarking adoption.

Regression: This is used to model how one dependant variable behaves depending on the values of a set of other independent variables. The dependant variable must be interval or ratio in type; the independent variables may be of any type, but special methods must be used when including categorical or ordinal independent variables in the analysis.

*Time series analysis***:** This is used to investigate the patterns and trends in a variable measured regularly over a period of time. May also be used to identify and adjust for seasonal variation, for example in financial statistics.

Graphical presentation: Presenting data in graphical form can increase the accessibility of your results to a non-technical audience, and highlight effects and results which would otherwise require lengthy explanation, or complex tables. It is therefore important that appropriate graphical techniques are used. This section gives examples of some of the most commonly used graphical presentations, and indicates when they may be used. All, except the histogram, have been produced using Microsoft Excel®.

*Column or bar charts***:** There are four main variations, and whether you display the data in horizontal bars or vertical columns is largely a matter of personal preference.

*Histogram***:** They are used to illustrate a frequency distribution in categorical or ordinal data, or grouped ratio/interval data and are usually displayed as a column graph.

*Clustered column /bar***:** These are used to compare categorical, ordinal or grouped ratio/interval data across categories.

*Stacked column/ bar***:** They are used to illustrate the actual contribution to the total for categorical, ordinal or grouped ratio/interval data by categories.

Percentage stacked column/bar: These are used to compare the percentage contribution to the total for categorical, ordinal or grouped ratio/interval data across categories.

*Line graphs***:** They are useful to show trends in ordinal or ratio/interval data. Points on a graph should only be joined with a line if the data on the x-axis are at least ordinal.

*Pie charts***:** They are used to show the percentage contribution to the whole of categorical, ordinal or grouped ratio/interval data.

*Scatter graphs***:** Mainly used to illustrate the relationship between two variables, of any type (although most useful where both variables are ratio/interval in type). Also useful in the identification of any unusual observations in the data collected.

Box and whisker plot: A specialist graph illustrating the central tendency and spread of a large data set, including any outliers.

Results and Findings

Presentation of the Data

After a reader fully understands just what the problem was and the manner in which it was investigated, the next question is, 'What is the evidence?'

The data are presented in terms of the problem. You have gathered a mass of data. You have then codified, arranged, and separated the data into groups, each of which correspond to a particular part of the problem being studied. The problem has been expressed in sub-problems to facilitate the management of the problem as a whole.

There is, then, a one-to-one correspondence: Certain data relate to each sub-problem.

You describe these in a logical sequence within the report. As each sub-problem and its attendant data are discussed, it is helpful to restate, at the beginning of such discussion, the sub-problem, perhaps even in the exact wording in which it appeared both in the proposal and in the first section of the study. Doing so will keep your reader oriented to the progress of the research as it is being reported; it will, likewise, focus the reader's attention on the specific aspect of the research problem under discussion.

One logical approach is to devote a separate section (each announced with its own heading or subheading) to each sub-problem and its pertinent data. Present the sub-problem, present the data germane to it, analyze and interpret those data, and present conclusions warranted by the data.

Each section might end with a brief summary in which the findings of that particular section are shown in relationship to the general problem and the previous sub-problems.

As seen from Figure 1 below, it is important to follow each sub-problem through the entire research. The reader must be able to see where you started and your findings and conclusions on each sub-problem identified. Your presentation of findings must also be consistent with each sub-problem.

So that the reader does not get lost in the data presentation, it is often helpful to begin the discussion of results with an advance organizer in which the researcher lays out the overall organization of how the results will be presented.

The data should be presented thoroughly and, of course, accurately. In many cases, it is helpful to organize some of them into tables, figures, and other concise presentations. A table is usually an arrangement of words, numbers, signs, or combinations of them in a two-dimensional matrix for the purpose of exhibiting certain information in compact and comprehensive form. A figure is any kind of graphic illustration other than a table: a graph, chart, flowchart, photograph, drawing, sketch, or other device to convey an idea, often in a nonverbal fashion.

When the data have been subjected to statistical analysis, present your rationale for employing the particular statistical approach (es) you used. It is important to know not only that you used a particular technique but also why you used it. In fact, throughout the entire research process, you should keep in mind that, generally, the answer to the question "What?" is not nearly as important as the answer to the question "Why?" One of the weakest links in many research reports is the failure to substantiate what one has done with a solid rationale as to why one has done it.

In a strictly qualitative study, the data are typically not analyzed in any statistical manner. Rather, they must be presented in such a way that they speak for themselves.

Qualitative researchers often engage in thick description, presenting the data in such detail that readers can see for themselves what is going on.

Descriptions of data in quantitative studies are typically written in an objective, "scientific" style. Those in qualitative studies vary from the objective and aloof, on the one hand, to the more subjective and personal, on the other. Qualitative researchers frequently include dialogues and participants' statements to illustrate their findings. They may also use metaphors and analogies to make a point.

Regardless of how you organize your presentation of the data, it is imperative that you present them as evidence for the conclusions that you draw from them. If the data are extensive and you choose to present them only in summary form in the body of the study, you should present them in their entirety in an appendix. In this way, anyone wishing to replicate the results of the research effort should be able to reach essentially the same conclusions (reliability of the study).

Let us not forget that we are also testing a hypothesis. Somewhere—probably in the closing paragraphs of the chapter—you should indicate whether the data did or did not support the hypothesis being tested. Restate the hypothesis and say explicitly whether it was supported or not supported by the data.

Reporting the findings of empirical research

There are obviously a number of possible ways of reporting research findings. The findings should encompass the main conclusions as developed from an analysis of the data. Note that you do NOT need to describe either the research instruments, or the data they generate, in great detail.

Most editors and peer reviewers in selecting articles for publication put the "So what?" factor high on their list of criteria. In other words, they want to see what the research adds to the whole body of knowledge, and you need to bring this out and so you should also bring out implications for practice.

Overall, the best advice is to read carefully the "Notes for contributors" of the journal you have targeted for your paper to see if they say anything about the research approach and description of methodology. You should of course look at articles published in that and other journals to see how other researchers present their research.

This is generally the longest section of the research project. The objective is to present and explain the data rather than draw interpretations or conclusions. The findings should be presented and analyzed on the basis of the research questions, specific objectives or hypotheses.

Tables, *charts* or *graphs* should be used to present quantitative data when appropriate. A brief description in words of what is shown in the table or figure should be provided. A general rule is to prepare the table or figure and the text, in such a way that they can stand alone in describing the outcomes of the study.

The chapter should present the results after analysis and give a brief interpretation of the findings. This also should be divided as per research questions so as to give answers for each.

A summary or synopsis of the major findings of the study should be provided at the end of the chapter.

Discussion, Conclusions and Recommendations

This chapter is generally considered as the most critical section of the research project and the most difficult part to write. The chapter, however, should have a framework that includes the following:

Introduction

The section should start with a brief summary of the structure or organization of the chapter.

The final chapter of the research project should provide a summary of important elements including the purpose of the study and research questions or specific objectives, research methodology used and major findings or results. It combines chapter 4 with previous studies or chapter 2 showing comparisons of the researcher's results and what previously done. Differences and similarities can be shown to allow the research to draw conclusions.

Discussion

Interpretation of the Data

All too frequently, researchers believe that, having once presented the facts and figures, they have done all that needs to be done. To display the data is certainly important, but the interpretation of the data is the essence of research. Without inquiring into the intrinsic meaning of the data, no resolution of the research problem or its sub-problems is possible.

One common error that many researchers make is to fail to exploit the data fully. One cannot turn over the facts too often, look at them from too many angles, or chart, graph, and arrange them in too many ways. Ask simple questions of those data. This is not to suggest that you should analyze the data to the point of virtually guaranteeing yourself a Type I error. But

sometimes, simple questions, naive approaches, will afford you startling insights. Have you thought of plotting the data? What has caused the plotted data to peak? to reach a plateau? To dip or plummet? Do dynamics within the data have relevance to events that lie beyond them? Questions like these may sometimes crack the shell of the data and reveal the meaning within.

At the same time, a researcher must not go too far beyond the data. Beginning researchers often lose sight of what they have actually found; so enthusiastic are they about their topic that they make extravagant claims and unwarranted inferences.

Research is indeed an exciting quest, but researchers must never let their enthusiasm influence their objectivity in interpreting and drawing conclusions from the data. The answer to the research question should rest solidly and completely on its own empirical foundation.

Look the data steadfastly in the face. Report honestly what those data reveal to you. Ferret out every conclusion you have drawn, underscore it in red, and then be sure that the data in the tables, graphs, and other exhibits solidly support what those words underlined in red declare. That is good research.

What if the data do not support your predictions? Does this mean your hypotheses were wrong? Not necessarily. Look once again at your methodology and statistical analyses to see if you can identify one or more weaknesses in what you have done. Perhaps one of your measurement instruments had lower validity or reliability than you had anticipated and so was not yielding accurate and dependable measures of a critical variable in your study. Perhaps you gave participants misleading instructions or asked them misleading questions. Perhaps your statistical analyses lacked power (maybe your sample was too small or your measures too unreliable) and so you made a Type II error. You should report any weaknesses and flaws in your study that may have influenced its outcome.

At the same time, maybe your hypotheses were wrong. In the interest of advancing the frontiers of knowledge, you must be sufficiently objective to admit when your thinking was flawed and offer reasonable explanations—perhaps in the form of alternative hypotheses that future research efforts might test—for the results that you obtained.

In the last analysis, the data must speak for themselves. The researcher is only the mouthpiece. You may not like what the data say. They may not confirm your fondest hopes or support your preconceived opinions, but the researcher is the servant of the scientific method. That method

looks at evidence squarely and without prejudice; it reports candidly and precisely what the impersonal data affirm.

Defending one's research effort is an academic tradition. Defend in this sense means "to justify one's conclusions, to support one's statements with the backing of solid data that have been presented in the document." Nothing short of this will suffice.

The discussion section should focus on the major findings of the study and should be organized or structured according to the research questions or specific objectives. The section should not be a repeat of the study findings and results as presented in chapter 4, instead it should provide interpretation of the results or major findings by comparing them to the findings of previous studies or theoretical background presented in the literature review.

Conclusions

Concluding the Report

Any research report should end by bringing closure to the interpretation of the data. In a thesis or dissertation, this discussion is often in a separate chapter entitled "Summary, Conclusions, and Recommendations."

In this section, all loose threads should be gathered together. This is the place for looking backward, for distilling into a few paragraphs precisely what has been accomplished in each phase of the research activity. One should be able to see the research endeavor as through the wrong end of a telescope: clearly, in miniature, with all significant aspects brought together in proper perspective. Here the researcher should clearly summarize the findings and conclusions pertaining to the problem and the sub-problems. The conclusions should be entirely supported by the data presented.

Then, the researcher is ready for three final steps: (a) stating whether the hypotheses have been supported or not, (b) identifying possible practical implications of the results, and (c) making recommendations for additional study, perhaps in those areas related to the problem that, during the research, the researcher recognized as worthy of further investigation.

A few words should be said about summaries. The whole research project—the problem, the data and their organization, the relationships and interrelationships—is so clear in the mind of the researcher that he or she may forget that the reader is not so intimately acquainted with the

project. Through lengthy and intensive involvement in a study, the researcher has an acute awareness of the master plan, the relation of each component to the total study, the parts as they fit into the whole. Readers, however, are not so fortunate. As they proceed through the report, they need to stop occasionally to consider how the text fits into the total investigation.

To facilitate readers' "journey" through a research report, a good researcher provides regular guideposts in the form of headings, transitional words and paragraphs, and other means of helping readers follow the train of thought. But in addition, the researcher provides a summary at the close of each extended discussion. By pausing long enough to summarize what has been happening and what relevance such discussion has to the overall research effort, the researcher maintains the unity of the whole. Doing so is tantamount to helping readers keep their eyes on the goalpost when, in the frenzy of the game, they need orientation and reference points. Discussions that ramble repeatedly tend to produce a psychological numbness, bewilderment and confusion. Frequent summaries prevent such reader disorientation.

A graphic organizer for the research report

One exercise that could prove valuable to the writer of a research report is to visualize the overall framework of the report. What is central can thus be distinguished from what is peripheral; what is basic, from what is ancillary. A good writer never leaves the reader in doubt as to what is happening during the discussion.

Let us think of the research problem as metaphorically covering a certain "area" of investigation. The sub-problems (we'll assume we have three) may each cover a significant portion of the area occupied by the problem. In the figure, the main dynamics of the research effort take place in a more or less horizontal system of activity localized under the area that indicates the "spread" of the problem. In this section, major conclusions drawn from the research findings should be presented.

The conclusion and recommendation chapter gives concluding remarks or summary and stand for the research on the statement of the problem. The author (s) combines all chapters and gives his or her general result or what is found according to the purpose of the study. The research can also give recommendations for some practical implications of the study to the users or recipients and relevant authorities. Conclusions should be drawn on the basis of research questions or hypothesis.

Recommendations

Research projects should provide recommendations for practice or improvement and for further studies. In applied research, recommendations are often provided for practice or improvement. In this case the researcher offers suggestions for improvement with justification. Research projects often pave way for further work. Consequently, the researcher should provide suggestions for future research work based on the findings and conclusions generated from the study.

Endnotes and Footnotes

Generally, endnotes or footnotes are used for two purposes. First they supplement information in the text of the report with additional information that strengthens the discussion. This type of note should be used sparingly and should not be used to explain complicated concepts. Keep such notes short and to the point. If you find your endnotes or footnotes becoming overly long and involved, sharpen your ideas and integrate them into the body of the report.

Second, endnotes and footnotes are occasionally used to acknowledge permission to quote or reproduce something from a copyrighted document. When you quote extensively or use a table or other graphic representation from a copyrighted work in a report you intend to publish or distribute widely, you must secure permission to reprint the material (in writing) from the owner of the copyright (the publisher or author). After you use the material, an endnote or footnote (rather than a citation) may be used to indicate the exact source from which the material was taken, followed by the words "Reprinted by permission of the publisher (or author)" or other wording stipulated by the copyright holder.

Reference List

A reference list at the end of your report allows readers to locate and use the sources you have cited. For this reason, it is imperative that reference information be complete

(e.g., it should include all of your citations) and accurate. To some extent, people in different academic disciplines format their reference lists differently, and you should follow the format that your institution or your discipline requires. Furthermore, you should apply that format consistently throughout your reference list. Remember, the grading of your work includes the accuracy, consistency and completeness of your reference list.

The reference list at the end of the project report or term paper provides the information necessary to identify and retrieve each source. Researchers should choose references judiciously and must include only the sources that were used in the preparation of the research project.

Agreement of Text and Reference List

Reference cited in the text must appear in the reference list; conversely, each entry in the reference list must be cited in the text. The author must make certain that each source referenced appears in both places and that the text citation and reference list entry are identical. Failure to do so can result in an expensive change after the research project report has been bound.

Referencing system

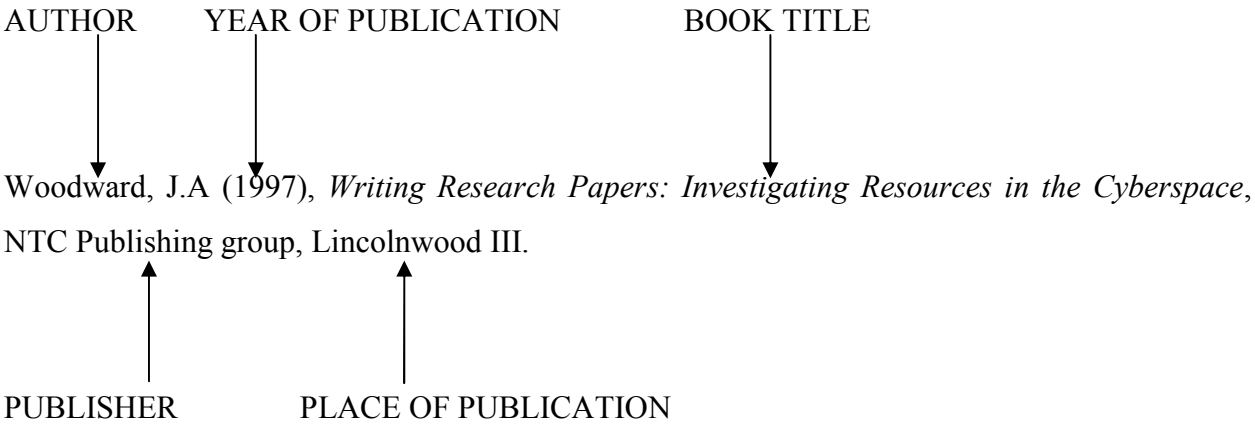
How to cite and list sources: A guide to using APA system

For a book

The details required, in order, are:

1. **Name (s)** of author (s),editor(s), compiler (s) or the institution responsible
2. **Year** of publication
3. **Title** of publication and **subtitle** if any (all titles must be italicized with sentence style capitalization)
4. **Series title** and individual **volume**, if any
5. **Publisher**
6. **Place of publication**
7. **Page number (s)** if applicable

One author



More than one author

Lamble, J & Morris, S (2001), Online and personal: the reality of internet relationships, Finch Publishing, Lane Cove, NSW.

For an Edited Book

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For a book or report sponsored by institution, corporation or other organization

Central Bureau of Statistics (1996), 1996 Census dictionary, Cat. No.2901.0, CBS, Nairobi.

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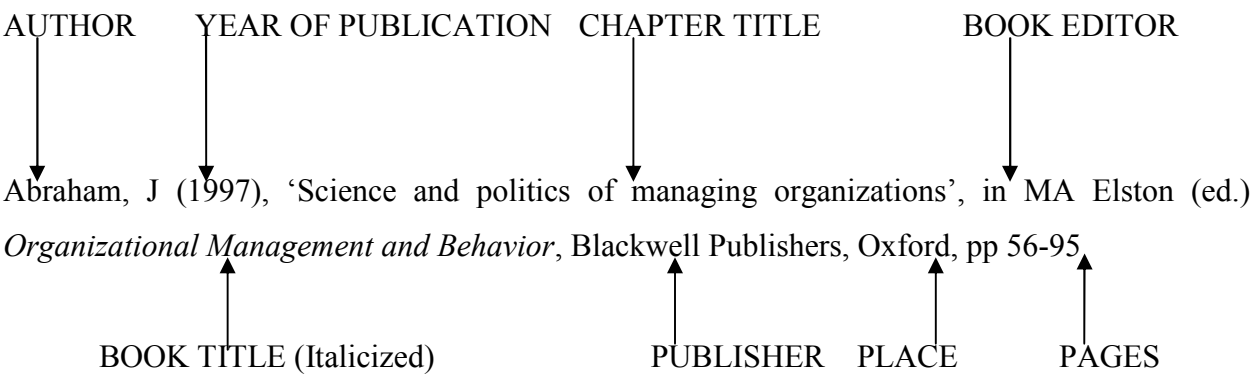


No author or editor

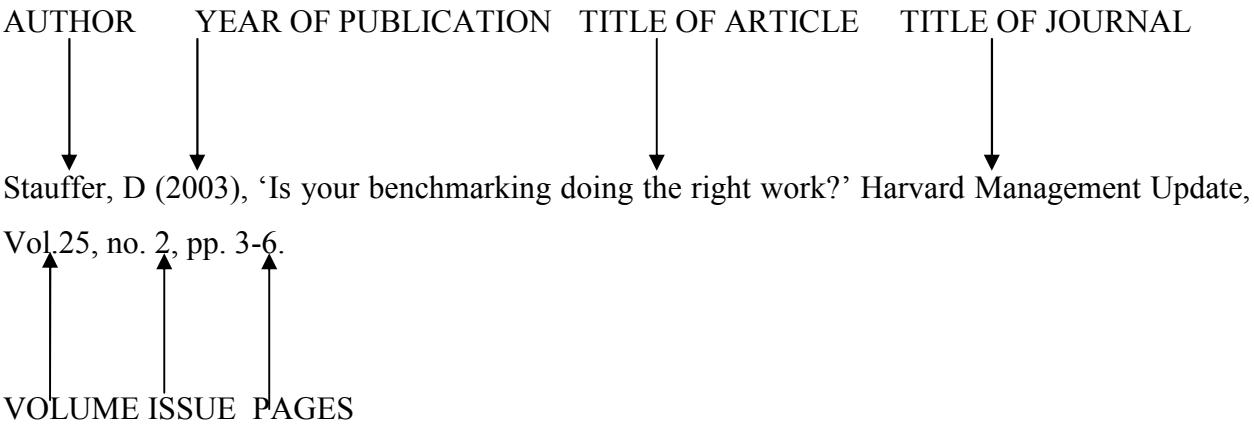
Cambridge advanced learners dictionary (2003) Cambridge University Press, Cambridge.

For an Article

The details required, in order, are:

1. **Name (s)** of author (s) of the article
2. **Year** of publication
3. **Title of the article** in a single quotation marks and sentence style capitalization
4. **Title of periodical** (Italicized with headline style capitalization)
5. **Volume** number
6. **Issue** (or part) number
7. **Page number (s)**

Journal article



Newspaper article

Jones, C & Yaman, E (1997), Contribution of the Jua Kali sector to the Kenyan economy', Daily Nation, 22 December, p.10.

For electronic sources

This could include sources from full text compact disk products or other sources from the internet.

The basic form of the citations follows the principles listed for print sources:

1. **Name (s)** of author (s) or the institution responsible for document, web page or site
2. **Year** of publication of document, creation of page/ site or date last revised

   Note: I f you cannot establish the date of publication, used n.d. (no date)
3. **Title** of the document (Italicized) or page, if possible
4. **Type of medium,** if necessary
5. **Name and place of the publisher, sponsor or host** of the source
6. Date item viewed
7. Web page or site address , or name of database on internet (if possible)

Web site

Kenya Bureau of Standards (2004), Kenya Bureau of Standards, Nairobi, Viewed 28 March 2004, available at: http://www.kebs.org

Web document

Pezzey, J.C (2002), *Sustainability Policy and environmental policy*, draft, 17 October, Economics and Environmental Network, viewed 18 November 2003, available at: http://een.anu.edu.au/download files/een0211.pdf

If no author is given, the title is used as the first element of the citation

Micro financing in Kenya: The challenges, 2002, 23 March, viewed 15 May 2003, available at: http://www.kenweb.co.ke

Reference in the text of your report / proposal

A textual citation generally requires only the surname of the author (s) and the year of publication (and specific page(s) if necessary). This is the case even when citing from internet sources. Page numbers should be included for quotations.

The citation may appear at the end of the sentence before the full stop, or at the beginning of the sentence.

Alternatively, the author's surname may be integrated into the text, followed by the year of publication in parentheses.

The full reference must be listed at the end of your report and the same format of referencing is used for documents attributed to an institution.

Examples

Poverty is an inherent feature of a market economy (Macintyre 1985)……

Macintyre (1985) has shown that poverty is an inherent feature of a market economy.

Abraham (1997, p.153) claims "research in medical sociology is not often concerned with medicines themselves"

On the economy, the World Bank (2003) expressed satisfaction with the economic reforms being carried out in Tanzania

NOTE: List of references **should be arranged alphabetically** by the first element of citation

Examples (as per above citations)

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Booker, C. (1997). *Technology and Innovation in the International Economy*. Cheltenham, UK: Edward Elgar Publishing Company.

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