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STYLE MANUAL OF TECHNICAL WRITING

Second Edition
Revised and Expanded

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PREFACE

The second edition of *The Style Manual of Technical Writing* is a revised and somewhat expanded version of the first edition. Feedback obtained from readers suggested the usefulness of including more practical examples in discussing certain topics, such as Outlining and Bibliographies. A new section on Page Format has been added.

This style manual has been written with the Pakistani technical writer in view. It tries to answer questions that frequently arise when preparing policy analysis reports, research-based papers, summaries, recommendations, and project proposals. Examples with relevance to the Pakistani context have been provided to illustrate the points made. Since the manual focuses on the special requirements of technical writing, it purposely avoids a detailed discussion of areas of a more general nature that are extensively covered in other style manuals, such as grammar and punctuation, although some basic guidance is offered in areas of importance to the technical writer. On the other hand, an entire section is devoted to a discussion of graphic aids and their incorporation in the text using microcomputer software. This has acquired increasing significance for the technical writer who no longer has to rely on professional help for graphic illustration of data presented in the text.

Guidance provided in the section on Research Proposals is based largely on information obtained by the author in an interview with Dr. Jerry Eckert of Colorado State University, to whom the author is grateful. Thanks are also due to Dr. Larry Morgan, team leader of the Economic Analysis Network Project, for his valuable guidance and for help in preparing microcomputer graphs for the chapter on graphic aids, as well as to Mr. Riaz Lodhi, EAN computer specialist, who was most helpful in preparing camera-ready copy for the press.

It is important to stress that the style suggested in this manual is not the only style that is "correct," and it is not intended to imply that other styles are "wrong." In fact, there is considerable disagreement among style manuals on matters of style and punctuation, and many different styles may thus be "right." The rules and general principles of style presented in this manual have been culled from many different sources, on the basis of general acceptance and practical usefulness, with the objective of providing the Pakistani technical writer with basic guidelines for more effective writing.

N.H.

WHAT IS TECHNICAL WRITING?

It is not easy to give a simple definition of technical writing since this term is variously used. For the purposes of this manual, the term technical writing is employed in a general sense to indicate documents written by professionals, for the use of either (a) other professionals, or (b) decisionmakers with specialized knowledge of the particular field to which a document relates.

A distinction has been made, wherever relevant, between technical writing and heavy technical writing. The latter term is used to indicate statistical documents and purely scientific or other similar writing, governed by its own rules, such as the extensive use of abbreviations and symbols.

Technical writing differs from general writing, most importantly, in respect of its goals. It aims at complete objectivity, and avoids opinion, bias, personal views, the creation of "mood" or "atmosphere," and the use of words and expressions that lack clarity and precision. The aims of technical writing, as opposed to writing intended for the lay reader, are set forth in detail in Chapter 1.

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1. THE AIMS OF TECHNICAL WRITING

1.1 Basic aims

The objective of all writing is effective communication. The basic goals of the technical writer are:

- a. to achieve orderliness in presentation through the logical organization of material and observance of the rules of style;
- b. to communicate with the maximum degree of clarity and brevity to a specific readership;
- c. to maintain the objectivity of the scientific approach;
- d. to be specific and to quantify data as far as possible;
- e. to present ideas and viewpoints convincingly, supporting them with statistical and other relevant data;
- f. to get action on any recommendations that have been made.

1.2 Orderly presentation

All communication is governed by a basic rule: it must have a beginning, a middle, and an ending. This rule also applies to technical writing. In addition, good technical writing (a) pursues a well-charted course, (b) refrains from meandering, and (c) moves logically, step by step, from beginning to end.

How can you, as a writer, effectively organize your thinking? A practical approach is suggested here, which some writers find to be useful. Jot down all the points you wish to cover relating to your subject, in whatever order they happen to occur to you. Next, sort out these jumbled thoughts into three main blocks--beginning of paper, middle, and end--and determine the major points to be stressed in each

section. You now have a basic skeletal structure to work on. The third phase requires the arrangement and expansion of material within these main blocks. This is done through the development of major heads and sub-heads (see Outlining, Chapter 4).

To achieve a meaningful discussion of your data, you may require an effective plan of data analysis, as discussed in Chapter 5. Paragraphs must be formed under each head and sub-head to group together related ideas and to ensure a smooth and logical transition from one thought to the next. Paragraphing is discussed in Chapter 6. The final phase is the long and painstaking task of refining, polishing, deleting, and adding--in other words, editing your report or paper to make it as effective as possible. Rewriting is often as important as writing--and may require considerably more time and effort!

13 Achieving clarity

Clarity and freedom from ambiguity are among the basic objectives of technical communication. It is not enough for a writer to be understood; it is equally important not to be misunderstood.

The first point to remember is that you cannot express your thoughts clearly unless your thoughts are clearly organized in your own mind. Unclear thinking leads to vague and confused writing. Secondly, even if you are clear in your mind about what you want to say, make sure your reader will be able to grasp it too: eliminate all chances of misinterpretation.

Some examples of writing that lacks clarity are given below.

Example 1

Five months ago a scheme was launched to involve the well-to-do farming community which is well-conceived but short of funds in the project.

The jumbled thoughts in this sentence can be sorted out and expressed more clearly as follows:

A scheme, well-conceived though short of funds, was launched five months ago to involve the well-to-do farming community in the project.

Example 2

This implement is used by the farmer with three short legs on wheels, a cutting blade and a handle, and the reduced need for maintenance increases his profits while it is also energy-saving.

This should be reworded as:

This implement has three short legs on wheels, a cutting blade and a handle. It is energy-saving and, because of its lower maintenance cost, increases the farmer's profits.

Unlike the objectives of a newspaper or a novel, the aim of technical writing is not to be clearly understood by the *general* reader; it aims at being clearly comprehended by *the class of readership for which it is intended*. The language to be used in a technical report thus depends on who will be reading it. The terminology normally employed in economics may be meaningless to a lay reader but is likely to add clarity and precision to a report for professional economists. This point is discussed further in 1.7 below.

1.4 The importance of brevity

Avoid all unnecessary wordage. Verbal adornments are neither required nor are desirable in technical writing. If deleting a word, phrase, sentence, or paragraph does not affect the meaning, or obstruct the flow of thought, delete it; it is not earning its place in the text.

Given below are examples of sentences and paragraphs which have been shortened without any loss of meaning.

Example 1

There is one other way that the farmer can reap his crop and that is through the use of a mechanical harvester. (Wordy)

The farmer can also reap his crop with a mechanical harvester. (Brief)

Example 2

The purpose of the report I am writing is to list, one by one, the many uses of pesticides in destroying pests. (Wordy)

The purpose of my report is to list the many uses of pesticides.

or

My report lists the many uses of pesticides. (Brief)

Example 3

The object on the table is a ruler. It is brown in color. It is made of pinewood. The pinewood was obtained from the trunks of pine trees that grow in the pine forests found in the area known as Nathiagali. (Wordy)

On the table is a brown ruler made of wood from the pine forests of Nathiagali. (Brief)

Example 4

The agricultural economist must take into account the following types of cost:

Cost of seed
Cost of fertilizer
Cost of irrigation
Cost of pesticides
Cost of labor
Cost of storage
Cost of marketing

(Unnecessary repetition of words)

The agricultural economist must take into account the following types of cost:

Seed
Fertilizer
Irrigation
Pesticides
Labor
Storage
Marketing

(Unnecessary repetition of the words "cost of" has been avoided.)

A good way to practice concise writing is to take paragraphs from printed newspaper or journal articles and try removing all unnecessary words.

Keep in mind that brevity does not mean that all sentences should be short; this would result in dull reading and unsatisfactory communication. Brevity means that all sentences, long or short, should be free from unnecessary words.

The use of abbreviations is permitted in technical writing, particularly in tables and charts. However, non-standard abbreviations are confusing, and should be avoided. The use of abbreviations is discussed in more detail in Chapter 10.

1.5 Retaining the original sense

The discussion in 1.4 above illustrates the importance of cutting out unnecessary words. On the other hand, clarity must not be sacrificed for the sake of brevity. The main objective is effective communication. A sentence or paragraph must not be shortened if doing so distorts the meaning. Two examples are given below to illustrate this point.

Example 1

The two machines vary in price but their basic operations are the same.

The word "basic" is not redundant in the above sentence, and it should not be deleted. Deletion of "basic" will change the sense of the original sentence.

Example 2

Dr. X is one of the foremost economists in the world in the area of supply response estimation.

The words "in the area of supply response estimation" cannot be deleted without distortion of meaning.

A technical editor must exercise particular care in striking out what appear to be "extra" words when editing papers on subjects that lie beyond his (or her) field of specialization.

1.6 Objectivity

Objectivity is a basic requirement of the scientific approach and is the hallmark of good technical writing. You can demonstrate your objectivity by:

- a. refraining from "value judgments," and
- b. supporting all statements made by you with reliable evidence obtained through your own research or the research findings of others

Example 1

"*Sindhri* mangoes taste better than *Langra* mangoes."

This statement involves a value judgement because taste is a subjective experience which cannot be objectively measured. (However, it is possible to measure the number of persons who say *Sindhri* mangoes taste better than *Langra*, and the preference ratio among buyers.)

Example 2

"Tubewells are more effective than canals for small-farm irrigation."

This statement, too, would be little more than an expression of a personal opinion *unless supported with factual evidence*. If you can give facts and figures to demonstrate the greater efficiency of

tubewells as compared to canals (with respect to relevant factors such as cost and performance) your statement becomes objective in its approach and is no longer a matter of opinion.

1.7 **Being specific**

Vague statements concerning number, quantity, or frequency are not very meaningful. Wherever possible, quantify data.

"Many farmers use fertilizers" is a vague statement. What is many? Ten? Fifty? Ten thousand? A specific statement would be: "Five thousand farmers, comprising 50 percent of the total farming community in the XYZ area, use fertilizers." If exact figures are not available, you should try to be as specific as possible under the circumstances. "Fewer than one fourth of the farmers" is more precise than "very few farmers;" and "approximately three fourths of the farmers" is better than "many" or "most" of the farmers.

To state ideas with clarity and precision, it is necessary to become familiar with and to employ appropriate terminology. Each discipline has evolved its own special vocabulary to avoid vagueness and confusion and to express its concepts with exactness. A good library is likely to have dictionaries covering specialized fields, such as economics, the biological sciences, and science and technology. Consult these books to find out the precise meanings of technical terms used by other writers, and to use them correctly yourself.

As an economic writer, you should know how to employ economic and mathematical expressions as precision tools. Terms such as "monopsony," "confidence interval," "heteroscedasticity," "restricted least squares," and "skewed distribution," convey to the economist specific meanings which cannot be expressed as briefly or as precisely using other words.

A note of caution may be sounded here. While specialized terminology and nomenclature form an integral part of scientific and technical writing, their proper use is not to make a paper look more impressive, but to communicate more effectively. In no event should "high sounding" terms be used by a writer as a cover-up for his ignorance--a situation satirized by Oscar Wilde in his remark: "To be understood is to be found out."

1.8 Creating conviction

Ideas are more convincing when they are expressed clearly and in a logical manner, and when statements are supported with appropriate data. Relevant tables and graphs are also effective ways of emphasizing a point. This is discussed in Chapter 15.

Technical writing has credibility when the reader is convinced that the writer

- o is knowledgeable about the subject;
- o is objective in his approach and has considered all relevant aspects of the subject;
- o is well-organized in his thinking and has deduced his conclusions logically;
- o has made suggestions which are practical and soundly reasoned.

1.9 Getting action

An important objective of some, though not all, technical writing is to get action. This is applicable to reports in which proposals and recommendations have been made.

Vaguely worded recommendations which do not suggest exactly what is to be done are seldom acted upon. It is important to state clearly the specific action recommended, define (if possible) the financial and other inputs involved, describe any problems that can be anticipated, suggest (as precisely as possible) the results that are likely to follow, and indicate the time frame in which results can be expected. The following example helps to illustrate these points. (All facts and figures used in this example are purely hypothetical.)

Example (Vaguely worded)

The country's huge requirements of wood have led to a rapid diminishing of forest areas. It is high time that serious attention is given to this grave matter and steps taken to rectify the situation before it is too late.

(The writer does not suggest any concrete steps to solve the problem -- which, too, is vaguely described.)

Example (Specific)

The country's requirements of 10,000 tons of wood per year have led to a rapid diminishing of forest area -- from 20,000 square miles in 1976 to about 15,500 square miles in 1986. Urgent steps must be taken to rectify this situation. The following measures are suggested.

a. **Protection of existing forest areas**

This includes measures to fight forest pests and diseases, and prevent forest fires. These responsibilities are presently handled by the XYZ Ministry, but a separate Directorate needs to be created for the purpose, and adequate funds must be made available. It has been estimated in a study undertaken by the ABC organization in 1956 that an additional investment of Rs.100,000 in forest protection measures will result in a saving of 5 percent of the forest area over a period of five years.

b. **Afforestation of new forest areas**

Selected seedlings can be cultivated in nurseries to be subsequently transplanted on the DEF mountain range. Initially, deodar and pine can be grown, since these trees have been successfully cultivated in such areas. It is estimated that the country can increase its forest cover by 3 percent over a period of five years with a financial outlay of Rs.500,000.

1.10 Summing up

Based on the points made in Sections 1.1-1.9 above, the following rules and procedures are suggested for the achievement of effective communication:

- a. sort out thoughts and ideas and determine the main points to be stressed;
- b. arrange the material so that:
 - o your paper or report has a beginning, a middle, and an end,
 - o there is a smooth transition from one point to the next through logical arrangement of material and sound paragraph construction,
 - o your meaning is expressed clearly, precisely, and forcefully, without wastage of words,
 - o all important statements and arguments are supported with adequate statistical and other data;
- c. present proposals convincingly, with specific recommendations relating to the action required and, if possible, indications of required time and money inputs.

2. THE COMPONENTS OF A REPORT

2.1 Order of items in a report

The components of a technical report can be organized in several different ways. The following sequence is commonly adopted.

(Front matter)

Title page

Foreword/Preface

Executive summary

Table of contents and lists of tables, charts, illustrations

(Text)

Introduction, including Review of literature

Research methodology

Analysis and findings (or Results and discussion)

Summary. Conclusions, recommendations. Policy implications

(Back matter)

Endnotes

Bibliography

Appendices

Glossary (if required)

2.2 Other arrangements

Various changes are possible in the above arrangement. For instance, the preface or foreword and the executive summary may be placed *after* the table of contents. The back matter of the publication may have the following sequence: appendices, notes, glossary, bibliography.

A report may not have all the components listed above. A short report may have the following sequence: a summary; an introduction which describes the subject, purpose and scope of the study, provides background, and describes research methodology; and lastly the support material comprising the body of the report, the appendices and the bibliography.

The following sections contain a brief discussion of the components of a typical report, as listed in 2.1 above.

2.3 Title

The title should be informative and should identify the key area (or areas) covered in the report. Readers sometimes decide whether a report is of relevance or interest to them mainly on the basis of the title. Therefore ambiguous or gimmicky titles fail to serve a useful purpose and are to be avoided.

2.4 Forewords and prefaces

A report may have a foreword or a preface--or both. A preface is written by the author; a foreword is written by some other knowledgeable person. The object of both preface and foreword is to introduce the reader to the study and explain its aims and objectives. The purpose is *not* to elaborate any points made in the text, or otherwise help the reader to better understand the text. Any such material should be incorporated in the text, or notes, as appropriate.

The usual length of a foreword is from two to four pages. The name of person who has written the foreword appears at the end, on the right hand side of the page.

Acknowledgments are included in the preface. The blank page on the reverse of the inside front cover is sometimes utilized for a short note of acknowledgments. If there is a long list of acknowledgments, this can be given as a separate section, often following the preface, or in the back matter of the book, following all other sections except the index.

2.5 The executive summary

An executive summary provides a brief but comprehensive picture of the entire study. It describes the problem, and the factors that have created the problem, explains the research methods used, defines the scope and limitations of the study, and makes recommendations about what should be done to solve the problem.

When writing an executive summary, keep the objective of the summary clearly in view. Usually, this will be to get action on, or approval of, a proposed course of action. Your summary will thus be written from the point of view of: (a) analyzing and assessing the existing situation, and (b) building up a case to support the course of action advocated by you.

Arguments both for and against may be provided and, if necessary, you may refer to the findings of other researchers in the field. Your summary may also present the executive with a choice of more than one courses of action, with a discussion of their pros and cons. Also, it should let him know, as far as possible, what it will cost to implement your recommendations, what other inputs are needed, what sort of results can be expected, and when they can be expected.

You should try to make your executive summary concise enough to fit on a single sheet of paper (two pages), although somewhat longer summaries may, at times, be unavoidable. The executive summary is written after the report is completed. The importance of a well-written summary is evident from the fact that it is frequently the only part of the report that is read--the busy reader may have no time to read the rest.

2.6 Contents lists

The contents lists (which include a list of the topics discussed in the text as well as lists of illustrations, figures, tables, and appendices) tell the reader exactly where to locate an item in the report. It is helpful to include major sub-headings, along with section headings, in the main table of contents to make it easier for the reader to locate an item within a section of the report. The title of the publication is given at the top, and each main and subordinate listed head is followed by the *initial* page number of that text division.

The list of figures (or other illustrations) follows the table of contents, on a separate page, followed by a list of tables, which also frequently begins on a new page. If there are not many figures or tables, they can be listed on the same page. If the entire text contains only one or two figures or tables, these need not be listed at all. The titles of figures and tables may be shortened when they are listed in the contents. Keep in mind that contents lists cannot be finalized until all the pages of the text have been numbered, as also charts and tables.

2.7 Introduction

The text of your report will often begin with an introduction. Here you will describe the problem, identify the scope and main focus of the study, elaborate its goals and objectives, highlight its importance, and provide background. You may mention in the introduction any problems you have

had to face in undertaking the study, describe the depth and range of the research effort and its limitations, and discuss the study plan. You may refer to other studies undertaken in this area.

A review of literature is usually included in the introduction, although some writers prefer to treat it as a separate section following the introduction. This is discussed in the following section, and some suggestions are offered on how to write a review of literature for your report.

2.7.1 *Review of literature*

Published writings which relate to the subject covered in your report may be reviewed in the introduction and referred to in other sections, wherever relevant. This is now preferred to the earlier practice of including a separate section headed "Review of literature."

There are several ways of finding out about current writings. Any good article in a recognized professional journal, on the subject of your interest, will provide you with some references. Go to the library and look these up. They are certain to lead you to other references. You should acquire familiarity with the cataloging system of a library and be able to locate books of your interest.

Most libraries also maintain volumes of abstracts, such as Agricultural Abstracts, Botanical Abstracts, and Economic Abstracts. You will find these to be useful in locating published material.

Various information centers offer referral services to other libraries and can access information for you from other library sources.

2.8 **Research methodology**

This section describes the research methods chosen by you for your study and explains why you considered this particular methodology to be the most appropriate. Frequently, your description of research methodology will include a discussion of the following sub-topics: (a) data base, (b) methods employed for data collection, and (c) the analytical model. To an economist, the analytical model will be of particular interest and will enable him to see how your conclusions were derived from your data.

2.9 Analysis and findings (or Results and discussion)

Various headings are given to this section, including those suggested above. A detailed analysis of the research effort and the findings is given in this part of your report.

Orderly and logical presentation is of great importance in this section, since you must provide here a sound basis for your conclusions and recommendations, and present your findings clearly and lucidly. Your knowledge of the principles of developing a convincing argument, outlining, paragraphing, and data analysis, will come in very useful. Usually, this is the longest part of the report.

2.10 Summary. Conclusions, recommendations. Policy implications

2.10.1 *Summary of content*

A summary of content has traditionally been used in professional and scientific writing, whereas an executive summary, used mainly in reports, is a more recent development.

The summary of content, unlike most executive summaries, is seldom action-oriented and is more often a summing up of the research findings or other information presented in the report. In other words, it is likely to be purely informative.

2.10.2 *Conclusions and recommendations. Policy implications*

The conclusions and recommendations section is a standard and highly important part of a report. Many economic writers also add a discussion of policy implications.

Your conclusions describe where the evidence presented in your report logically leads to, and the deductions you have made from your analysis of the data. If no definite conclusions have been reached by you, inform your reader accordingly, and give reasons. For instance, you may explain that the duration of the study was inadequate, or that certain findings could not be quantified because of the lack of reliable statistical data.

Recommendations are a logical step that follows the report's conclusions. It is here that you suggest, on the basis of your findings, the course of

action to be followed. If definite conclusions have not been produced by your study, as discussed above, and you are hence not in a position to make recommendations, you may suggest the need for a longer or more extensive study, or a change in research methodology. Or you may propose the adoption of interim measures until such time as more definite recommendations can be made.

If you wish to get action on your report, the importance of writing your recommendations in a well-reasoned, convincing, and forceful manner is evident. The course of action suggested by you should be practical and, if possible, should quantify proposed inputs and anticipated results, and should provide a time-step breakdown or plan of phased implementation (also see 1.9).

The importance of a discussion of policy implications is also obvious, and frequently this discussion is dealt with in a separate section. The impacts of various policy options may be presented here, and their advantages and disadvantages examined.

2.11 Endnotes

Endnotes are often preferred to footnotes for the reasons given in Chapter 13. In a book or book-length work, they are placed at the end of each chapter or section. In a paper or report which is not divided into chapters, they are placed at the end of the text. Both endnotes and footnotes help you to identify your sources, particularly when you are quoting directly from them. You may also use endnotes (or footnotes) to provide your readers with useful information that you do not wish to include in your main text, or to offer commentary on the text. For a further discussion of footnotes and endnotes see Chapter 13.

2.12 Bibliography or References

"References," "Bibliography," or "Select Bibliography" are some headings frequently given to this section. Use "References" to list the works you have actually referred to in the text. "Bibliography" or "Select Bibliography" lists the works you have consulted or found otherwise relevant in writing your text, but to which you have not actually referred. The format to be followed in preparing a bibliographical listing or list of references is described in Chapter 14.

2.13 Appendices

Appendices (also written as appendixes) consist of material that may be helpful to the reader of the document but is not an essential part of the text. They often follow the endnotes and bibliography in the back matter, but may also precede the endnotes. The material included in the appendices may be in the nature of detailed calculations and equations, illustrative tables and charts not considered necessary or appropriate for inclusion in the text itself, forms, questionnaires, or copies of contracts.

Each appendix should be treated as a separate unit and given a separate number. To keep appendix numbers distinct from the numbers of other elements in the text, you can use a combination of letters and numbers: for instance, appendices may be numbered A-1, A-2, and so on. If your appendices fall into two or more logical groups, the main group headings will be Appendix A, Appendix B, and so on, and the individual appendices in each group will be numbered as A-1, A-2, A-3, B-1, B-2, B-3, and so forth.

2.14 Glossary

A glossary is an alphabetized list of technical terms or foreign phrases used in the text, with their definitions. A glossary may be required when a technical work is written for a lay reader, who is not familiar with the terms used. A glossary is also helpful when it has been necessary to include several foreign words in the text (for instance, Urdu terms in English text.) A period is not used at the end of a glossary definition unless it is a complete sentence.

2.15 A word about abstracts

2.15.1 *Use in professional papers*

An abstract is rarely included in a technical report, although abstracts are commonly included in papers published in professional journals. For the benefit of those who will be writing abstracts, a brief discussion is given below.

An abstract is always placed at the beginning of the main body of a paper. The lower limit of an abstract is one or two sentences. The maximum length is usually determined by the nature and length of the

report. However, about 150 words is usually considered a reasonable length.

A line of keywords following the abstract facilitates the indexing of the article by the secondary services and makes it quicker and easier for such services to locate an article for a researcher interested in what has been published in that particular area. A keyword is a significant word, often (but not always) taken from the title itself, that indicates an important subject area covered in the paper.

Example

Title of paper: Use of Nitrogen in the Prevention of Blight in Rice

Keywords: Nitrogen, blight, rice. "Fungicides" and "plant diseases" are also appropriate keywords, though these are not taken from the title.

Abstracts are generally described as being either indicative or informative. The two types are sometimes combined. In general, material not contained in the document should not be included or referred to in an abstract.

2.15.2 *Indicative abstract*

An indicative abstract indicates the scope of the report and the topics covered; it does not tell the reader what the writer says concerning these topics. You can use a report's table of contents or outline as the basis for an indicative abstract: the listed headings help you to quickly identify the areas covered. If the report is a brief one, the section headings, or sub-headings within a section, can also be utilized for this purpose. Alternatively, the indicative abstract may consist of a sentence, or a few sentences, describing what has been covered in the paper.

2.15.3 *Informative abstract (summary)*

An informative abstract not only outlines the scope of the report and describes the areas surveyed, it also summarizes the main points made by

the writer. Since the informative abstract summarizes the key content of the report it is, in fact, a summary, and to avoid confusion, this term is generally used for an informative abstract. The two types of abstracts may be combined.

2.15.4 *Indicative, informative abstracts compared*

An indicative abstract and an informative abstract (summary) of an article on "Prospects and Some Policy Problems of Agricultural Development in China"¹ are given below to illustrate the differences between the two types of writing.

Examples

Indicative abstract

China's major policy goals in agriculture and the policy problems likely to arise in attempting to achieve these goals are examined. Available policy options are discussed.

Informative abstract (summary)

China appears to be pursuing three major policy goals in agriculture--sustaining rapid growth, minimizing the state's commitment of resources for agriculture and rural development, and preserving some degree of collective ownership of the means of production, notably land. Chinese policymakers face a dilemma because these three goals cannot be achieved simultaneously, and one objective must be sacrificed. The choice is whether to accept a lower rate of growth of agricultural output, a higher level of state expenditures for agricultural development, or a further erosion in the degree of collective ownership and its resulting adverse effects on the distribution of rural income.

1. "Prospects and Some Policy Problems of Agricultural Development in China," *American Journal of Agricultural Economics* 68, No.2 (May 1986): pp. 451-457.

2.15.5 *Uses of abstracts*

Abstracts have several uses. Some of these are:

- o the reader can know at a glance what areas the paper or report covers;
- o planners of conferences or seminars make use of abstracts to decide on acceptance, rejection, or scheduling of papers;
- o as a result of the growth of computer technology, abstracts are increasingly used in information retrieval systems;
- o a well-written abstract is of great significance in creating a positive attitude towards your paper or report.

2.16 **Indexes**

An index is generally not required in a report or other short document. However, in lengthier publications it is helpful to include one, or more than one, index. The main types of indexes (also written as indices) are the Alphabetical (or general) Index, Author Index, Subject Index, and Keyword Index.

The most commonly used index is a general index (described in most publications simply as "Index"). This is an alphabetical listing of all major elements in the text. It includes both proper name entries and subject entries; it cites all page numbers on which they appear or are discussed.

An Author Index is used in a publication which contains writings by several authors, such as a professional journal. The names are listed in alphabetical order, with last names first.

A Subject Index is an alphabetical listing of subject areas. This is not a list of article headings, but is a listing of all the topics covered or referred to in the text. Proper name entries are generally not included. It is usual to use a keyword index in place of a subject index. This type of index makes use of keywords which are frequently indicated by the authors themselves in the abstracts of their papers (see 2.15.1).

An index, like a bibliography, is set in the "flush and hang" style (see 14.2).

3. ORGANIZING THE MATERIAL

3.1 Basic formats

You can make use of various methods to organize your material. In general, three basic organizational patterns are employed: straight line, building block, and inverted pyramid.

3.2 Straight line

The straight-line format presents material in a purely sequential order -- alphabetical, chronological, or numerical, or the order in which steps are to be accomplished. If you are writing a purely informational report, for instance describing how a certain operation is carried out, this format is useful. A report of this nature will seldom contain conclusions or recommendations.

Example (in summary form)

Procedure for Sowing of Wheat

Step 1

The field is ploughed with a tractor, for deep ploughing as well as for normal ploughing.

Step 2

Planking is carried out over the entire area to be cultivated, in order to level the soil.

Step 3

The seed is sown, using the drill method, with 40 kg of seed per acre.

Step 4

Basal doses of fertilizer (DAP and urea) are employed.

Step 5

Weeding of the planted area is undertaken at two-week to four-week intervals, depending on field conditions. The area is irrigated at recommended intervals.

The advantage of this format is that it is easy for the writer to organize his material in a chronological or step-by-step sequence. Its limitations are that this type of report can be used only for certain purposes and may have restricted use elsewhere.

3.3 Building block

The building block format uses a brief introduction as a premise, then builds upon this logically, one step at a step, until the conclusions and recommendations are reached.

This format provides the writer an opportunity to develop a sustained argument and to carry the reader along with him to his conclusion. Because the conclusion is logically derived, it is likely to be more convincing. The negative side to this format is that the most important part of the report, the conclusion, must be held back till the last.

An article that illustrates the building block format is given below. (Because of space limitations, the article is highly condensed).

Recent Food Policy Lessons From Developing Countries²

Introduction

World food problems were not solved during the ten years following the 1974 World Food Conference. This essay seeks to outline some elements of a new food policy agenda for the rest of the century.

Changed perspectives

The commodity crisis of 1973-74 led to widespread belief among third world officials that world food production would lag behind population growth. This proved to be far off the mark. Per capita production of food increased globally, and world

2. The example cited here is a highly condensed version of a paper by Walter P. Falcon published in *The American Journal of Agricultural Economics*, 66, No. 2 (May 1984).

prices of grain declined in real terms. At the same time it became apparent that greater food output is unlikely to make much of a dent in global hunger and that attention must be given to income generation and productive employment as solutions to hunger problems.

Successful approaches to food policy

Successful food policies have recognized that: (a) food objectives must be defined, (b) multiple ministries must be involved, and (c) food problems require programs and policies, not just projects.

Conclusions and recommendations

Two propositions are now clear. First, hunger is seen as part of a food policy much more complex than expanded agricultural production. Second, the basic food policy dilemma is seen to have short-run/long-run, producer/consumer, and price policy dimensions. For many developing countries, the critical issue is improving producer incentives while, at the same time, initiating a targeted set of consumption programs to assist low-income households. Effective food policy in the third world must deal with both production and consumption needs. Recognizing the joint nature of the food problem is the first step; resolving the problem is the main research and policy task for the next decade.

3.4 Inverted pyramid

The inverted pyramid format is what you find in most newspaper reports: the most important news is presented first in this type of story, followed by items of lesser importance. A report written in the inverted pyramid style puts conclusions and recommendations near the beginning. The main body of the report, the endnotes, bibliography, appendices, and indexes (if any) follow. The main difference between this type of report and the building block type is that here the conclusions and recommendations are presented first.

The report cited in 3.3 above as an example of a building block format can be changed to an inverted pyramid format by putting the conclusions and recommendations at the beginning instead of at the end.

The inverted pyramid report has the advantage, noted above, of starting off with the important conclusions and recommendations section--which may be the only part of the report many readers will get to read. Moreover, if the conclusions and recommendations are interesting enough, they may motivate the reader to read the rest of the report.

The weakness in this format is that conclusions and recommendations are presented before the necessary background has been provided or an argument has been developed to lead up to the conclusions.

3.5 Which format is right?

No single format is right for all types of writing. However, most economic writers have achieved a compromise between the inverted pyramid and building block formats: they use the building block format in their report to logically develop their argument, but put an executive summary at the beginning of the report. In this way, the executive with limited time can get to the gist of the report, in particular the recommendations, without having to read the entire text. On the other hand, readers who are professional economists interested in finding out the methods employed for the study and how conclusions were derived, will find a detailed, step-by-step exposition that leads up to the conclusions in the rest of the report.

4. OUTLINING

4.1 What is outlining?

The logical organization of material has been discussed in Chapter 3. After organizing your material in a coherent form, you will still need to give it a specific pattern, a formal arrangement readily recognizable to the reader. Outlining is the arrangement of material in a formal pattern using the principle of main headings or divisions, subheadings, sub-subheadings, etc. The main heads are all equally important, the subheads are of equal importance, and so on. The main purpose of outlining is to help your reader to quickly identify the main areas of discussion, and the various sub-divisions within the main areas. There are several ways of outlining your material, some of which are described below. The method advocated here is the decimal system, which is used in this manual.

4.2 The decimal system

Like other systems of outlining, the decimal system of numbering is employed to separate main heads from subheads, subheads from sub-subheads, and so on, in a methodical way. Each additional decimal point in a number signifies a smaller grouping within a larger one.

This is how the decimal system works.

1.	Main head (chapter or section number)
1.1	Subhead
1.1.1	Sub-subhead
1.1.2	Sub-subhead
1.2	Subhead
2.	Main head

The decimal style of outlining has come to be increasingly accepted in scientific and technical writing because it offers the maximum degree of precision and because it often enables deletions and additions to be made with little disturbance of the rest of the text. In the example given above, if you delete sub-subsection 1.1.2, the other sections are not disturbed and their numbers need not be changed. If 1.1.1 is deleted, 1.1.2 is simply changed to 1.1.1 without disturbing the other numbers. Also,

other subsections, or sub-subsections can be easily added on, for instance, subsections 1.3, 1.4, etc. or sub-subsections 1.1.3, 1.1.4 etc.

When using decimal outlining, do not use any indentation: the numbers themselves clearly indicate a main section, subsection, sub-subsection, or still smaller division. However, the main chapter or section heading may be centered on the page. It is preferable to give every numbered subdivision a heading.

A word of caution! A long row of figures signifying a subordinate section looks clumsy and tends to be confusing. In general, it is best not to go beyond three digits, that is the sub-subsection level, unless necessary.

In the example below, subordinate headings to the fourth level are shown for the benefit of the writer who may have occasion to use this degree of subordination.

Example

1. COMPONENTS OF PRODUCTION ECONOMICS

- 1.1 Developing Structure and Performance Information
 - 1.2 Identification of Basic Economic Relationships
 - 1.2.1 Tools
 - 1.2.1.1 Micro-Descriptive Studies
 - 1.2.1.2 Micro-Prescriptive Studies
 - 1.3 Economic Policy Analysis Information

 - 2. Organization of Production Economic Analysis
 - 2.1 Information base
 - 2.2 Organization
- (And so on.)

4.3 Using numbers and letters

Other systems of outlining are also in use. For instance, the major sections or chapters may be identified by roman numerals (Section I, II, etc.). Each section will begin on a new page, with the section number and section title centered, in capital letters, at the top of the page. The sequence adopted is illustrated below.

Example

I. CHAPTER (OR SECTION) HEADING

A. Heading

1. Heading

a. Heading

(1) Heading

(a) Heading

i. Heading

ii. Heading

iii. Heading

The first subdivision, capital letter A, is flush with the left margin. Each subdivision thereafter is indented five spaces (5, 10, 15, 20 etc.).

The first word of text in a new subdivision is lined up directly beneath the first letter of the heading.

Every numbered subdivision has a heading.

4.4 Using indention alone

Some writers indicate the degree of subordination through the use of indention--instead of decimals, roman and arabic numerals, or capital and lower-case letters of the alphabet. This is illustrated below.

Example

-----	Main heading
-----	Subheading
-----	Sub-subheading
-----	Sub-sub-subheading
-----	Sub-sub-subheading
-----	Sub-subheading
-----	Subheading
-----	Main heading

In the above example, each subdivision moves to the right by five spaces, indicating a further degree of subordination. A heading is generally given with each new indention.

5. BASIC METHODS OF ANALYZING DATA

5.1 Three basic methods

Not infrequently, a technical writer is confronted with a jumbled mass of data from which it is difficult to derive meaningful conclusions because the data relate to units with divergent characteristics. How should such data be analyzed and presented in a technical report? Here we will concern ourselves not with sophisticated methods of data analysis, but with three basic methods. These are classification-partition, comparison-contrast, and cause and effect.

5.2 Classification-partition

The first step when using this method is to identify a broad group, for instance farms in irrigated areas. Sub-groups may then be formed within this broad group by selecting farms which share major features in common, for instance canal-irrigated and tubewell-irrigated. Farms with wheat/cotton and rice/cotton rotations could be further subdivisions within the sub-groups, and these could again be subdivided into still smaller groups with similar characteristics, for instance farms making regular or infrequent use of pesticides. The decimal system of outlining is particularly convenient to use with this method of data analysis.

5.3 Comparison-contrast

An item--or procedure--can be compared and contrasted with another, and if this is the method of your choice, your data will need to be analyzed accordingly. Let us say you are discussing laser printers and conventional printing presses. You may find that similar printing quality can be obtained with both and that paper costs are similar (comparison). At the same time, you can list the dissimilarities, for instance that the laser printer is faster than the other, that maintenance costs are lower as compared to a conventional printer, or that specialist operators are not required (contrast). It is not a good idea to go back and forth between the two items you are comparing, listing a strength of item A and then a strength of item B, or a weakness of one item and then a weakness of the other. Instead, you can employ one of two methods. Either: (1) list all the strengths of item A and then the strengths of item B followed by the shortcomings of item A and then those of item B; or (2) list all the

strengths and weaknesses of item A and then list all the strengths and weaknesses of item B. The first of these two methods is, generally speaking, more interesting for the reader and offers a more direct comparison of the advantages of different items or procedures and their disadvantages.

5.4 Cause and effect

A third method of analyzing data is cause and effect. Here you establish links between isolated data by showing a causal relationship. For example, if Country X has had above-average wheat production in 1977, 1981, and 1986, and statistics also show increased use of fertilizers in these years, you may attempt to causally relate the two and show that the increased use of fertilizers was an important factor responsible for higher wheat yields.

The writer must keep in mind that two events occurring together, or one after the other, need not be causally related, and there should be no attempt to suggest such a relationship in the absence of adequate data to support it. For instance, if a new method of sowing was employed in a certain year and higher yields were obtained, the writer should not *assume* a causal relationship: the higher yields may have been due to increased use of fertilizer or more efficient irrigation.

5.5 Which method is best?

In addition to the methods described above, various other methods are also used in data analysis. No one method can be singled out as the "best" in all situations. Your choice of method will depend on your objectives and the nature of your data.

If your data relate, for example, to an area which has farms of divergent sizes and characteristics, for which you are suggesting some improved methods of cultivation, your most effective way of analyzing your data may be classification/partition. This will enable you to sort out your data in terms of homogeneous groups with similar characteristics. You can then make recommendations which have relevance to a particular group.

If you have data on two different types of equipment (or two different procedures) which are used to perform the same task, your best method

of analyzing the data will be comparison/contrast. This will enable you to evaluate their relative advantages and disadvantages.

Cause and effect will be the most effective method of analyzing your data if you are seeking to establish a causal relationship between two or more different sets of data such as use of fertilizers and increased yields, level of farmer education and farm management efficiency.

The cause and effect method is of particular value to the agricultural economist, who is frequently seeking to demonstrate the impacts of policy changes. When presenting the policymaker with a set of policy options, the economist demonstrates how the adoption of a particular policy (cause) impacts different agricultural sectors (effect). For instance, if the price of wheat increases, will this result in increased wheat production, other factors remaining unchanged? And if so, by how much will production increase in response to a given price increase? The use of modern econometric techniques as precision tools has enhanced the effectiveness and validity of this method for the policy analyst and its usefulness for the policymaker. Graphic aids can also be very effectively employed to demonstrate the quantified impacts of policy or other changes in areas such as production and pricing.

6. PARAGRAPHING

6.1 What is a paragraph?

A sentence has been described as a unit of writing and a paragraph as a unit of thinking, comprising a cluster of related ideas. A new paragraph is most frequently used for a change in the direction of the writer's thought: as his thoughts take a new turn, a new paragraph mentally steers the reader in this new direction.

A paragraph is usually built around one important thought. This thought constitutes the topic sentence. The remaining thoughts in a paragraph elaborate and reinforce the basic thought expressed in the topic sentence. All these supporting thoughts must be arranged in a well-knit, logical, and pleasing pattern that develops the main thought. The sentences within a paragraph may be linked by means of connectives--conjunctions, prepositions, and linking phrases--or the use of pronouns. Often, the logical transition from one idea to the next is itself a link and a formal connective is not needed.

Do not try to put more than one major thought into a paragraph unless the thoughts are so closely connected that they must be placed together. Usually, the "new" thought will actually be a supplementary thought supporting the main topic sentence.

6.2 Length of paragraphs

It is difficult to state the ideal length of a paragraph. Your writing is likely to have paragraphs of different lengths, both long and short, since the length of paragraphs depends largely on the number of related thoughts supporting each topic sentence.

A basic rule to follow is: avoid a succession of long paragraphs which tend to be boring--and are visually unappealing; avoid a succession of short paragraphs which result in jerky reading.

6.3 Types of paragraphs

In general, paragraphs are of four kinds:

a. *Introductory*

This type of paragraph is used at the beginning of your document, to introduce your subject. It will also be used at various other places in your writing, when you have finished the exposition of one line of thought and are moving on to a new point.

b. *Transitional*

As an idea is developed, transitional paragraphs carry the reader along from a discussion of one aspect of the idea to the next. Skilful transitional paragraphs maintain the chain of thought or reasoning, and smoothly steer the reader in the direction in which you would like to take him or her as you unfold and develop your argument.

c. *Recommending*

This is the type of paragraph you will use if your report ends with suggestions and recommendations. Since it attempts to goad the reader into action it must be forceful and well-reasoned; it must create conviction, and it must offer specific suggestions (see 1.9).

d. *Concluding*

Your writing may end with recommendations, as discussed above, or with a summary. Even if it does not end in either of these ways, you still need an effective concluding paragraph to bring together and tie up in a neat knot the various threads of the argument. Without this, the reader will have the feeling of being left in midair, instead of being escorted to an intended goal or destination.

6.4 *Continuity*

Make sure there is a smooth flow of thought from one idea to the other within a paragraph, and also from one paragraph to the next. In this way you will carry your reader along with you smoothly as you develop your theme, from an interesting beginning to a forceful end.

6.5 Indentation of paragraphs

You may choose not to indent the paragraphs in your text, or you may prefer to indent. These alternative styles are discussed below.

6.5.1 *Block-style paragraphing*

Although paragraphs have traditionally been indented, it is now increasingly common to use block-style paragraphing. When this style is used, paragraphs are not indented but are separated from each other by extra space. Technical writers are beginning to prefer this style because it gives a neater and more orderly appearance to the text, especially in conjunction with the decimal numbering system. Block-style paragraphing is used in this manual.

6.5.2 *Indented paragraphs*

When an indented paragraph style is preferred, only the first line of a paragraph is indented, while subsequent lines are flush left.

It is common *not* to indent the first line of the very first paragraph of a chapter or section. The first lines of subsequent paragraphs are indented.

7. PUNCTUATION

7.1 Major uses

Punctuation marks are used by the writer to clarify the structure, and hence the meaning, of sentences. While a detailed explanation of the various uses of punctuation marks is beyond the scope of this manual, a few important uses, mainly those with particular relevance for the technical writer, are discussed below.

7.2 Comma

7.2.1 *Day, month, year*

A comma is used to separate the year from the day of the month. It is usually omitted when only the month and the year are given.

Examples

December 25, 1988

December 1988

7.2.2 *Words in a series*

If a sentence contains a series of three or more elements, the elements are separated by commas. When the last two elements are joined by a conjunction (such as "and"), a comma is placed before the conjunction.

Examples

The metals used for the purpose are iron, tin, copper, and bronze.

He could invest in agricultural machinery, improved plant varieties, or increased acreage.

The farmer, the zamindar, and the irrigation engineer were discussing the situation.

7.2.3 *Omission of words*

A comma indicates the omission of a word or phrase which is readily understood from the context or which has appeared earlier in the sentence.

Examples

In Karachi there are five such banks; in Lahore, three; in Islamabad, one.

Maxi-Pak wheat is preferred by some; Pak 281 by others.

7.2.4 *With other punctuation*

Commas can be used along with quotation marks and parentheses. Although it may appear more *logical* to place the comma outside the quotation marks if it does not punctuate the quoted matter, the *conventional* usage --advocated by most style manuals--is to place the comma within the quotation marks in all cases. This practice is followed by most writers (also see 7.10).

Examples

He has used the term "supply response," which is readily understood.

If parenthetical matter is followed by a comma, the comma is placed after the last parenthesis.

Example

His major crops were cotton (the improved variety recommended by the research station), wheat, and maize.

7.3 **Period**

7.3.1 *End of sentence*

A period indicates the end of a sentence that is neither interrogative nor exclamatory, but is simply declarative. An interrogative sentence ends in

a question mark, and an exclamatory sentence has a mark of exclamation at the end. Periods are not used to end such sentences.

Examples

It is raining. (Declarative)
Is it raining? (Interrogative)
It's raining! (Exclamatory)

7.3.2 *Sentence within a sentence*

A period is not used at the end of a sentence that is included within another sentence.

Example

The farm (I had not seen it for five years) was greatly changed.

7.3.3 *Lists*

In a vertical list, if numerals or letters are used to enumerate items, each letter or numeral is followed by a period. Each item in a list may begin with a lowercase letter or a capital.

Examples

1. Fertilizers
 2. Seed
 3. Pesticides
-
- a. nitrogen
 - b. phosphorus
 - c. urea

No periods are required after items in a vertical list unless one or more of the items are complete sentences. If the items in the list are separated by commas or semicolons, the list will end with a period.

7.3.4 *Titles, captions, headlines*

Do not use periods after headlines, subheads, book or report titles, captions of figures, and column heads in tables. There are some exceptions to this rule: if, for example, the headline is a complete, quoted sentence, quotation marks as well as a period will be used.

Example

Small Farmers Regarded as Target Group
but
"Small Farmers Form Our Target Group." -- Agriculture Secretary

7.3.5 *Period and quotation marks*

When a period and quotation marks come together, the period is placed within the quotation marks. (See 7.10.)

7.3.6 *Space after period ending a sentence*

In typewritten material, two spaces are generally given following a period that ends a sentence; in typeset (printed) material, only a single space.

7.4 *Apostrophe*

7.4.1 *Possessives*

Nouns that do *not* end in an *s* or *z* sound, whether singular or plural, form their possessive case by the addition of an apostrophe plus *s* to the end of the word. *Singular* nouns that end with an *s* or *z* sound form their possessive case in the same way.

Examples

the economist's viewpoint
the farmer's field
the researcher's goal
the workmen's time
the fence's measurements
the press's output

If a *plural* noun ends in an *s* or *z* sound, the possessive case is formed by adding only an apostrophe (without an *s*) to the end of the word.

Examples

growers' concerns
researchers' goal
goats' feeding habits

There is an exception to the above rule. In the case of a one-syllable, irregular plural, add an apostrophe plus *s*.

Examples

mice's holes
lice's extermination

7.4.2 Possessives of phrases

To form the possessive of a phrase, add an apostrophe plus *s* to the last word in the phrase.

Examples

chairman of the board's directives
the officer-in-charge's responsibility

[Note: It is preferable to write "the directives of the chairman of the board" and "the responsibility of the officer-in-charge."]

7.4.3 Joint possession

To indicate joint possession, add an apostrophe plus *s* to the last noun in the sequence.

Examples

Ahmad and Khan's paper
Amir, Bhatti, and Chohan's research

Some writers prefer adding a possessive to each name (Ahmad's and

Khan's paper; Amir's, Bhatti's, and Chohan's research). This is also correct.

7.4.4 *Contractions*

Apostrophes mark the omission of letters in two or more words that are combined and pronounced as one word.

Examples

don't o'clock
couldn't it's

[Note: "It's" should not be confused with "its." The former is a contraction of "it is," whereas the latter is a possessive. The following example illustrates the correct use of the two words: It's raining, but the umbrella is useless without its handle.]

When forming the plural of a date or an acronym, an apostrophe is not required before *s*.

Examples

1980s MPs POWs

[Note: It is incorrect to write '80's. Instead, write '80s, 80's, or eighties.]

7.5 *Semicolon*

The major uses of the semicolon are described below.

7.5.1 *In compound sentences*

A semicolon may be employed to give a desirable pause and produce better balance in a compound sentence.

Example

Haq advocated increased spending; Ahmed opposed it.

7.5.2 *In a series of phrases*

A semicolon may be used to divide a series of phrases that already contain commas, or which are long and complex.

Example

The areas included in the survey were: Lyari, Karachi; Gulberg, Lahore; and Satellite Town, Rawalpindi.

7.6 **Colon**

The colon is *not* interchangeable with the semicolon. This is evident from the uses of the colon described below.

7.6.1 *Connecting link*

The colon is a mark of introduction as well as a connecting link: it signifies that what follows it is linked with what precedes it. When a colon separates the first clause of a sentence from the second, the second clause generally illustrates or amplifies the first.

A colon also serves to give a special emphasis to what follows by providing a break in the grammatical construction signifying that the earlier clause will be supported or completed by what follows.

Example

The farmers were motivated by three considerations: increased profit, greater convenience, and quicker results.

7.6.2 *With lists and series*

A colon is often used to introduce a list or a series.

Examples

Particular attention was given to the following areas: harvesting practices, post-harvest storage, and marketing.

The following crops were studied:

- a. wheat
- b. cotton
- c. maize

7.6.3 *Quotations*

A colon can be used to introduce quotations, usually lengthy quotations that are set off from the other text as a separate paragraph. However, a colon may also be used to set off a quotation in running text, especially a lengthy quotation, or a formal statement. (Informal quotations are introduced with a comma.)

Examples

The Minister read out the following prepared statement:

"I have no comment to offer at this point other than to assure you that the situation is under control and is receiving the full attention of the government. Crop damage is now being assessed."

The Minister stated: "I am concerned at this new development, but we have the means to take appropriate action."

7.7 *Dashes*

Dashes may be used to indicate a sudden break in thought and the insertion of a supplementary thought within the existing sentence structure. (Parentheses can also be used for this purpose.) To avoid any confusion with hyphens, in typewritten material dashes are indicated as a double hyphen.

Example

The plan presented here is better than the earlier one--though both have their weaknesses--and it is also likely to be more economical.

7.8 *Hyphen*

A hyphen is often used between parts of a compound word if that compound word is used as an adjective.

Examples

government-financed project
canal-irrigated farm
two-thirds complete (*but* two thirds of the total amount)

7.9 Italics

The following are italicized:

- o names of newspapers, magazines, and similar periodicals
- o names of books
- o foreign words
- o scientific terminology employed in taxonomy
(see Chapter 11)

Italics are also used for emphasis.

7.10 Quotation marks

When a quote is a complete sentence, enclose the concluding comma, semicolon, or period inside the quotation marks.

When a sentence contains a phrase inside quotation marks which exists independently of the rest of the sentence, and a comma or period is needed following the phrase, place the comma (or period) inside the quotation marks—even though it may appear more logical to place it outside. This style is suggested in conformity with current usage.

The conventions governing the use of quotation marks with other forms of punctuation can be summed up as follows:

- a. the comma and the period are *always* enclosed within quotation marks.
- b. the colon and semi-colon are *never* enclosed within quotation marks.

- c. The dash, question mark, and mark of exclamation are placed *after* the quotation marks if they apply to the whole sentence. They are enclosed *within* the quotation marks if they apply to the quoted material.

Examples

The Minister said: "No comment."

The Minister's remark was "No comment"; he added that a statement would be issued later.

Can this statement be interpreted as "no comment"?

He shouted, "No comment! Absolutely no comment!"

7.11 Parentheses

Parentheses have several uses. Some of these are described below.

7.11.1 *Supplementary elements*

Parentheses enclose supplementary elements inserted into a main statement, particularly inserted material that is incidental or digressive (also see 7.7).

Example

Azam Khan was the most successful cotton grower (yield: 4000 kg per hectare) of the 1986 cotton season.

7.11.2 *Abbreviations*

The abbreviated forms of the names of organizations are enclosed within parentheses following the spelled out form.

Example

The World Health Organization (WHO) has introduced a new immunization plan.

7.11.3 *Bibliographical data*

In running text, parentheses set off bibliographical or historical data about books, articles, or other published works (see 13.2).

Example

The earliest published version (Khan and Matin 1978) failed to produce the desired impact.

7.11.4 *Items in a series*

Parentheses enclose numbers which enumerate items in a series in running text.

Example

It is important to indicate our requirements in terms of (1) money inputs, (2) specialized equipment, and (3) professional skills.

7.11.5 *With other punctuation*

If a comma is required following parenthetical matter, it is placed after the second parenthesis. If a sentence ends with a parenthesis but the matter enclosed within the two parentheses is part of another sentence, the terminal punctuation (period, question mark, exclamation mark) is placed outside the parentheses. On the other hand, if an independent sentence is enclosed within parentheses, the terminal punctuation is placed within the parentheses.

Examples

Although the observation method was inconvenient (a researcher had to be in the field 24 hours a day), it was most suitable for our purposes.

We chose the observation method (although a researcher had to be in the field 24 hours a day).

The observation method was inconvenient. (A researcher had to be in the field 24 hours a day.)

8. NUMBERS AND PHYSICAL QUANTITIES

8.1 Figures or words?

In scientific and heavy technical writing, figures are preferred to the spelled-out forms of numbers in almost all cases. If you are writing a statistical report, for instance, you may use no numbers in the written form at all--unless a sentence begins with a number, in which case it may be spelled out. Many other reports and papers are of a professional but not highly technical nature. In such writing, too, figures are frequently used, but their use is governed by certain basic rules which are explained in this chapter along with rules that apply to highly technical or scientific writing.

8.2 Figures within a sentence

If numbers appear within sentences, apply the following rule: for numbers 10 and above, use figures; for numbers nine and below, use words. This rule is generally observed in all types of writing except statistical or tabular documents. There are, however, several exceptions to the rule which are explained in the following paragraphs.

8.3 A number that begins a sentence

If a sentence begins with a number, spell it out instead of using a figure. A long, spelled out number looks awkward, however, and it is better to avoid this by rewriting the sentence so that the number is no longer at the beginning.

Examples

The farm employs 15 full-time workers. (Correct)

Fifteen full-time workers are employed on the farm. (Correct)

Fifteen thousand, two hundred and eleven workers are employed in the factory on a full-time basis. (This is clumsy and should be reworded as below.)

The factory employs 15,211 workers on a full-time basis.

8.4 Adjacent numbers

If it is necessary to write two numbers adjacent to each other, write one in figures and the other in words: This is done to avoid confusion.

Examples

20 6-inch gauges (Confusing)

Twenty 6-inch gauges (Correct)

In 1986 200 new schools were opened. (Confusing)

In 1986, two hundred new schools were opened. (Correct).

The above sentence can also be reworded to avoid bringing the two figures together, as follows:

Two hundred new schools were opened in 1986.

8.5 Numbers in a series

When numbers below and above 10 appear together in a series, all the numbers are expressed as figures.

Examples

The three reports were 4, 17, and 29 pages in length, respectively.

The first assignment took 3 hours to complete, the second 10 hours, and the third 3 1/2 hours.

8.6 Headlines

In headlines, figures may be used for numbers of any size.

Example

Survey Covers 5 Small and 10 Large Farms

8.7 Percentages

In statistical reports, in scientific and heavy technical writing, as well as in tabular matter, a percentage is written as a figure followed by the % sign. No space is given between the figure and the % sign.

Examples

3% density

a 4.5% solution

In writing that is of a more general nature, a percentage is expressed as a figure followed by the word "percent."

Examples

The extent of crop damage was 3 percent.

The dividend on the shares increased by 1 percent.

However, some writers prefer to use the % sign, particularly when the figure is expressed as a decimal fraction, or when a document contains numerous percentage figures.

8.8 Decimal fractions

Decimal fractions are always written as figures. If the fraction is less than one, put a zero to the left of the decimal point. This is sound practice because a decimal point may occasionally be lost in the printing or other reproduction process. Write a decimal fraction as two digits to the right of the decimal point, unless the figure qualifies a noun or is expressed as a percentage, in which case write only one digit to the right of the decimal point.

Examples

5.25

0.10

0.5 kg (figure qualifies a noun)

0.5% (figure is expressed as a percentage)

If there is a long figure to the *left* of the decimal point, the following rules apply:

- o In running text, put commas after every three digits, counting from the decimal point to the left. (Do not use commas after any figure to the *right* of the decimal point.)
- o In tabular matter, put a space after every three digits, counting from the decimal point, to the left and to the right.

Examples

Running text

572,321,000.52130
31,335.000005

Tabular matter

572 321 000.521 30
31 335.000 005

8.9 Common fractions

If a common fraction is not a mixed fraction, spell it out. If it is a mixed fraction, write it as a figure.

Examples

one third of the distance
three-fourths empty
5 1/3 percent 2 1/2 times

8.10 Very large numbers

In scientific and heavy technical writing, you can avoid the use of long numerals by using special units of measure, multipliers, and powers of ten.

Examples

Megahertz (one million hertz) MHz

10^{10} (10,000,000,000)

In non-technical writing, large numbers (one million and above) are often expressed in figures to which the words "million" or "billion" are appended.

Examples

He invested Rs.5 million in the project.

The age of the sun is estimated to be 4.5 billion years.

(However, 200 thousand is incorrect. Write it as 200,000 or two hundred thousand.)

When using the words "million" or "billion", do not use a figure that goes beyond two decimal places. If this degree of accuracy is required, write the whole amount as a figure.

Examples

Instead of Rs. 7.125 million, write Rs. 7,125,000.

Instead of Rs. 3.5527 million, write Rs. 3,552,700.

8.11 The metric system

8.11.1 Base units

The International System of Units (Systeme international d'unites, abbreviated SI), used in Pakistan and in many other countries of the world, is popularly known as the metric system. It has seven base units:

<u>Measure</u>	<u>Unit</u>
length	meter
mass	kilogram
time	second
electric current	ampere
thermodynamic temperature	kelvin
amount of substance	mole
luminous intensity	candela

All units are written with lowercase letters and initial capitals are not used. Units derived from the base units, such as kilogram, kilometer, millisecond, are similarly written in lowercase style.

No periods are used with any of the abbreviations in the international system. (For abbreviations, see 10.9.1)

8.11.2 *Use of figures with SI units*

Use numbers ranging only between 0.1 and 1000 in expressing the quantity of any SI unit: for numbers smaller or greater than these, use a smaller or a bigger SI unit. Instead of 15,000 meters or 15,000 m, write 15 km. Write 4mm^3 instead of 0.004 cubic centimeter or 0.004cm^3 .

8.12 **Physical quantities**

Physical quantities--weight, distance, length, area, volume, pressure, etc. --are always expressed as figures in statistical, technical, or scientific writing, whether the unit of measure is written in full or an abbreviation or symbol is used instead.

Examples

70 miles	3 mi
3 feet	75 lb
5 1/2"	22 kg
5°C	35°28'N

In *general* writing, figures are used to express quantity when the units of measurement are written as abbreviations or symbols.

Examples

8 cm	6"
10.5 kg	Rs 4.75

When abbreviations or symbols are not used for units of measurement, you may adopt either of the following practices:

- a. write all quantities as figures. This is particularly convenient

when several numbers appear in a sentence and it would look cluttered if these numbers are spelled out.

- b. use figures for quantities greater than nine and words for smaller quantities.

Examples

The area cultivated by the four farmers was estimated to be 5 acres, 7 acres, 3 acres, and 16 acres, respectively.

The first picking produced a mere five quintals of fruit; the second yielded no less than 15 quintals.

8.13 Currency

For sums of money, use a figure if the abbreviation "Rs." is used, and spell out the number if you use the word "rupees". If a number is written as both figures and words, the "Rs." sign--or other signs and symbols for foreign currency--may be used.

Examples

Fifty thousand rupees (not Rs. Fifty thousand)

Rs.5,000 (not 5,000 rupees)

Rs.3.5 million

a \$10 million loan

8.14 Parts of a publication

Numbers that refer to chapters, pages, sections, tables, graphs, and so on, are always set as figures. Lowercase roman numerals are commonly used for pages constituting the front matter of a book or report, and arabic numerals for all other page, chapter, and section numbers.

Examples

Pages 29-30

Examples (contd.)

Figure 12.1 appears in Chapter 12
The foreword appears on pages iv-ix

8.15 Dates

Year numbers are written as figures. If a sentence begins with a year number, you may spell it out, but it is preferable to re-write the sentence to avoid beginning it with a year number.

Examples

The book was published in 1987.
(Instead of: 1987 was the year the book was published.)

The year 1947 is important in the history of the sub-continent. (This is preferable to: Nineteen forty-seven is an important year in the history of the sub-continent.)

8.16 Day, month, year

In Pakistan, the day-month-year sequence is used. No commas are required when using this sequence, nor are the letters "th" required after the figure for the day.

Examples

15 April 1987 (not 15th April 1987)

14 August 1947
(or write the 14th of August)

If the month is written first, a comma is needed.

Example

August 14, 1947

If only the month and year are given (and not the day), no comma is required.

Examples

The events of August 1947

The issue of May 1988

8.17 Eras

The abbreviations A.D. and A.H. *precede* the year number, whereas the abbreviation B.C. *follows* it.

Examples

The year A.D. 1988 corresponds to A.H. 1408.

The city was destroyed in 58 B.C. and was rebuilt in A.D. 950.

8.18 Time of day

8.18.1 *A.m., p.m., and o'clock*

When using a.m. or p.m., do not use "morning" or "evening." Also, do not use "o'clock" with a.m. or p.m.

The use of figures is correct with a.m. and p.m. However, avoid using figures with "o'clock."

Examples

4 p.m. in the afternoon (Incorrect)

eight a.m. (Incorrect)

6 p.m. o'clock (Incorrect)

Six o'clock is preferable to 6 o'clock.

8.18.2 *Exact time*

Use figures when you wish to give the exact time.

Examples

The President will address the nation at 6:30 this evening.

We are trying to catch the 2:20 afternoon flight.

The survey begins tomorrow morning at 5:00.

Alternatively, you can use the twenty-four system, also known as the military system, of expressing time. Here, no punctuation is used between the hours and the minutes. It is not necessary to write morning or evening, as the time of day is indicated by the figure itself.

Examples

The flight departs at 0820.

Banks are open from 1600 to 2100.

8.19 Roman numerals

Roman numerals are used for numbering the pages that constitute the front matter in a book or report (such as the preface or foreword). They also have various other uses in scientific and technical writing, for instance in mathematics. The general principle used in the formation of roman numerals is that a smaller letter after a larger one adds to its value, whereas a smaller letter before a larger one subtracts from its value. A bar over a letter multiplies its value by one thousand. A list of roman numerals and their arabic equivalents is given below.

<u>Roman</u>	<u>Arabic</u>	<u>Roman</u>	<u>Arabic</u>	<u>Roman</u>	<u>Arabic</u>
I	1	XVI	16	XC	90
II	2	XVII	17	C	100
III	3	XVIII	18	CC	200
IV	4	XIX	19	CCC	300
V	5	XX	20	CD	400
VI	6	XXI	21	D	500
VII	7	XXII	22	DC	600
VIII	8	XXIII	23	DCC	700
IX	9	XXIV	24	DCCC	800
X	10	XXX	30	CM	900
XV	15	L	50	M	1000

9. CAPITALIZATION

9.1 Primary use

The primary use of capitalization is to distinguish proper nouns from common nouns. Some other uses, of particular relevance for the technical writer, are discussed below.

9.2 Proper names

Begin all proper names and their abbreviations with capital letters.

Examples

Ministry of Food, Agriculture, and Cooperatives

Himalayan bear

Pak. Agric. Res. Coun.

9.3 Titles of documents

Capitalize the first letter of each word in the title of a paper or report with the exception of prepositions, conjunctions, articles and other similar words.

Examples

Vertebrate Pest Control in Rural Sind

Experiments with New Rice Varieties in Punjab

9.4 Professional designations

Capitalize professional titles only when they immediately precede a personal name and where both title and name are used in combination as a single appellation.

Examples

Director Anwar Ahmad Chairman Zia Khan

9.5 Designations used without names

When titles are used alone, in place of a name, they are lower-cased.

Examples

the director of the project

the chairman of the committee

9.6 Incomplete designations

Use lowercase when giving an incomplete designation.

Examples

the university

the government

9.7 Terms containing proper names

When a proper name forms part of a term, the proper name is usually capitalized.

Examples

Gresham's law

the Lewis-Fei-Ranis model

9.8 Chapter and section headings

The use of capitals or lowercase for chapter or section headings depends on the preference of the writer or publisher, and many different styles

are in use. Some books use all capitals for chapter headings, and headline style capitalization (capitalizing the initial letters of all words except short prepositions) for section or subsection headings. Others use large capitals for chapter headings and small capitals for section headings, or large lowercase type (with an initial capital) for chapter and section headings, and lowercase type of a smaller size for subordinate headings. While it is difficult to lay down any hard and fast rules in this matter, the following arrangement is suggested: use all capitals for main headings; use uppercase and lowercase (headline style) for subheadings. If a section contains numerous subsections, sentence-style capitalization (lowercase with only an initial capital letter) may be used for each subheading (as in this manual).

9.9 The words "chapter" and "section" in the text

When references to a chapter or section appear in the text, it is usual to capitalize these words when they are followed by cardinal numbers identifying specific chapters or sections. In other cases, use lowercase.

Examples

This topic is discussed in Chapter 5.

See Section 7.

the third chapter of the book
in the first section

9.10 Table of contents

The style of capitalization in a table of contents follows the style used for headings in the text (9.8). The general rules are:

- o section or chapter headings appear in capitals, as in the text;
- o all other headings appear with either the first letter of major words capitalized, or only the initial letter capitalized, depending on which of these styles has been used in the text.

9.11 Captions of tables and figures

See Chapter 15.

10. ABBREVIATIONS

10.1 Use only standard abbreviations

Non-standard abbreviations coined by a writer for use in his document are confusing for the reader. Use only standard abbreviations that are known and recognized. For example, "company" should be abbreviated only as "Co." (and not "Coy."), and "department" as "dept." (not "deptt."). If you are not familiar with standard abbreviations, consult a good dictionary of abbreviations. You will find some listed in the Bibliography.

10.2 Do not use too many

The use of abbreviations in the text of a document that is not of a highly technical nature should be minimized. Thus, it is preferable to write percent instead of %, southeast instead of SE, and department instead of dept.

10.3 Preferred uses

Abbreviations are preferred and are commonly used in notes, bibliographies, tables, charts, maps, graphs etc. The use of abbreviations is also generally preferred in statistical documents. In heavy technical and scientific writing, too, words indicating distance, length, area, volume, weight etc. are frequently abbreviated.

10.4 Use of periods

The current trend is to minimize the use of periods after abbreviations. However, there is no agreement about which particular abbreviations need a period and which do not. A general rule is given here which may be of some help to readers of this manual: a period is frequently used with abbreviations formed by dropping all but the initial letters of a word (fig., bull., Co.) or by dropping the middle letters of a word (secy., mfg., Ltd.); it is usually omitted from abbreviations consisting of the initial letters of words constituting a phrase or a compound word. (PC, qid). This is not a hard and fast rule, however, and there are many exceptions.

10.5 Initial-letter abbreviations

Some abbreviations are made up of initial letters, written in lowercase, without periods.

Examples

bp	boiling point
rms	root mean square
gcd	greatest common denominator
pdf	probable density factor

Periods are used if the abbreviation might be confused with some other commonly used word: for instance, "intermediate frequency" is abbreviated as i.f., and is not written as "if."

More frequently, uppercase letters are used for initial-letter abbreviations.

Examples

FY	fiscal year
ETA	estimated time of arrival
COD	Cash/collect on delivery (Also written as C.O.D. or c.o.d.)
FOB	free on board (Also written as f.o.b.)
GNP	gross national product
GDP	gross domestic product
R&D	research and development
PERT	program evaluation and review technique
O&M	operations and management

10.6 Agencies, organizations

The name of an agency, organization, or association is spelled out the first time it is used in a text and the abbreviation is given within parentheses following the full name. Thereafter, the abbreviation alone may be used.

Example

The Agricultural Development Bank of Pakistan (ADBP) has formulated a new scheme of agricultural loans. The scheme, announced by ADBP last week, will be implemented shortly.

If the abbreviation is more recognizable than its full form (for instance, DDT, ID card, VIP, Ltd.), it need not be spelled out, even on its first reference.

10.7 Plurals of abbreviations

If an abbreviation ending in a period stands for a single word, the plural is usually formed by adding "s" before the period.

Examples

fig.	figs.
col.	cols.
dept.	depts.
no.	nos.

Abbreviations without periods that stand for phrases or compounds also form their plurals by the addition of "s."

Examples

CODs and IOUs
PCs
VRAs
NOCs

10.8 Months, days of the week

Names of months and days of the week are written in full in text. In reference material, tables, bibliographies, etc., the names of months (except May, June, and July) are abbreviated and days of the week are also frequently abbreviated.

Examples

(Text)

15 August, 1987 (or August 15, 1987)
the August 1987 issue
Monday, August 12

(Tables, references)

Aug. 15, 1987 (or 15 Aug. 1987)
Aug. 1987
Mon., Aug. 12

10.9 Units of measure

10.9.1 *International system*

The International System of Units (abbreviated as "SI") is used in Pakistan. It is also known as the metric system. The base units of the system are listed in 8.11.1. The following abbreviations are used for these units.

m	meter
kg	kilogram
s	second
A	ampere
K	kelvin
mol	mole
cd	candela

Some other commonly used metric units are abbreviated as follows:

ha	hectare
t	metric ton
L	liter

Lowercase is used for all SI units. Abbreviations are also lowercased, except those derived from proper names (such as K, which stands for Kelvin, named for Baron William Thompson Kelvin, and A, which stands for Ampere, named after Andre Marie Ampere).

No periods are used with any of the abbreviations in the international system. A space is given between the number and the abbreviation.

10.9.2 *Plurals of abbreviations: SI units*

The plural abbreviated forms of units of measure in the metric system are always the same as the singular forms.

Examples

kg	(kilogram, kilograms)
km	(kilometer, kilometers)
m	(meter, meters)

10.9.3 *Traditional units of measure*

Abbreviations of some traditional (non-metric) weights and measures are as follows.

B.t.u.	British thermal unit
cal.	calorie
ft.	foot, feet
gal.	gallon
hp	horsepower
hr.	hour
in.	inch
kw	kilowatt
lb.	pound
min.	minute
mpg	miles per gallon
oz	ounce
psi	pounds per square inch
qtr.	quarter
sec.	second
yd.	yard

10.9.4 *Plurals of abbreviations: traditional units*

When using traditional units of measure the plural forms of abbreviations may be written in the same way as the singular forms.

Examples

sec.	second, seconds
in.	inch, inches
ft.	foot, feet

10.10 Commonly used abbreviations

Some abbreviations commonly used in technical writing are listed below.

abbr.	abbreviation, abbreviated
ad loc.	<i>ad locum</i> (at the place)
anon.	anonymous
app.	appendix
bibliog.	bibliography, bibliographical
cf.	<i>confer</i> (compare)
chap.	chapter
comp.	compiler
const.	constant
def.	definition
dept.	department
dist.	district
div.	division
doz.	dozen
ed.	editor
c.g.	<i>exempli gratia</i> (for example)
eq.	equation (plural: eqq. or eqs.)
engg.	engineering
enr.	engineer
eq.	equation (plural: eqq. or eqs.)
et al	<i>et alii</i> (and others)
fig.	figure
ibid.	<i>ibidem</i> (in the same place)
incl.	inclusive, including
loc. cit.	<i>loco citato</i> (in the place cited)
MS	<i>manuscriptum</i> (manuscript), pl. MSS
non seq.	<i>non sequitur</i> (it does not follow)
op. cit.	<i>opere citato</i> (in the work cited)
repr.	reprint
trans.	translated, translator
vol.	volume
wt.	weight

11. SCIENTIFIC TERMINOLOGY

11.1 Knowing the rules

Every writer of technical and professional reports and papers is likely to use scientific terminology, frequently or occasionally. For instance, the agricultural economist may need to refer to bacterial and fungal plant pests, soil micro-organisms, or chemicals used as fertilizers. Such terminology, in particular the naming of plants and animals (taxonomy), is governed by specific rules, which the technical writer should know. Some basic rules are described in the following paragraphs.

11.2 Genus and species

Italic type is used for the generic and specific (Latin) names of plants and animals, both in lists and in running text. The species name is lower-cased, even if it uses a proper adjective. The genus name is capitalized.

Examples

Nicotiana asiatica
Pinus roxburghii
Bandicota bengalensis
the genus *Smilodon*

After the first use, the genus name may be abbreviated.

Example

Rattus rattus is a serious pest of grain crops in Pakistan. During laboratory studies, rice and millet were readily consumed by *R. rattus*.

11.3 The names of subspecies

The names of subspecies, when used, follow the specific name and are also set in italic type:

Rattus meltada pallidior
Noctilio labialis labialis

In systematic work, the name of the person (or persons) who proposed a specific or subspecific name is added in roman type, the name often being abbreviated.

Examples

Lycopersicon esculentum Mill.

Oryza sativa L.

Other designations following generic, specific, or subspecific names are also set in roman type.

Examples

Dasychira sp.

Rosa rugosa var.

11.4 Larger divisions

Divisions larger than genus--phylum, class, order, and family--are capitalized and set in roman type.

Examples

Chordata (phylum)

Mammalia (class)

Primata (order)

Homonidae (family)

11.5 Intermediate groupings

Roman type is also used for intermediate groupings, such as a subfamily, or a suborder.

Examples

Ruminantia (a suborder)

Homoninae (a subfamily)

11.6 Common names of plants and animals

Vernacular (common) names of plants and animals are not capitalized. If a proper noun is part of the name this is usually capitalized.

Examples

sour orange
kinnoo mandarin
Virginia creeper
Bengal tiger

11.7 Economic and other laws and principles

Only proper names attached to laws, theorems, principles, etc. are capitalized.

Examples

the law of diminishing returns
Malthusian theory
monetarism
Bertrand's duopoly model

11.8 Chemical names and symbols

The names of chemical elements and compounds are lowercased when they are written out in full. If symbols are used, these are capitalized, and are set without periods.

Examples

potassium	K	cobalt	Co
nitrogen	N	calcium	Ca
sodium	Na	zinc	Z

12. RESEARCH PROPOSALS

12.1 Aims

A research proposal is a specialized form of technical writing which has specific aims and objectives and which is governed by rules that help in the achievement of these aims.

The foremost goal of your institution, when submitting a proposal, will be to win the contract and obtain funds to carry out the research it is bidding for. In order to be successful, it must convince the funding agency that it is the organization that is best suited for the work. However, no sensible institution will make a bid for research which it will be unable to carry out satisfactorily.

12.2 Information provided in a research proposal

In order to demonstrate your capability you, as a bidder, must convince the funding agency that: (a) your organization has adequately qualified persons to do the job; (b) it understands the project and the way in which the work is to be done; (c) it has the necessary facilities, for instance microcomputers, or vehicles for work in the field, if such equipment is required; (d) it has adequate experience of the kind that is needed for the research project; and (e) it has the necessary management skill and financial strength.

12.2.1 Personnel

When listing the persons on your staff, you must also clearly indicate which persons will be assigned to the project, the specific responsibilities they will handle, and how their training and experience qualify them to undertake these responsibilities. This is important because some of your professional staff may be engaged in other projects and may not be available for this particular assignment. For this reason, primary as well as alternate candidates should be listed for all major jobs. Do not make your research proposal deliberately vague or misleading in order to impress: let it be a clear and honest presentation of staff capabilities--and staff availability.

12.2.2 *Experience*

The type of experience you will mention will include experience in carrying out research work and familiarity with research methodologies. Your institution will also need to show that it has the capability to manage a research program of the scale and type proposed and can acquire the services of enumerators, field supervisors, and data processing personnel.

12.2.3 *Deficiencies*

It is best to be objective about your organization, instead of glossing over your limitations. In any case, shortcomings cannot be hidden and are likely to be revealed by those who are listed as your contact persons, for whom your organization has worked in the past, and who are certain to be contacted by the funding agency to check your track record. However, in the implementation plan (see 12.3.1.3) you may indicate how you will get around these deficiencies.

12.3 **Physical format of research proposal**

Your proposal will consist of two separate volumes--or three, if cost proposals are required. Volumes 1 and 2 constitute the technical proposal, whereas Volume 3 contains the financial proposal.

12.3.1 *Volume 1*

In this volume, you will present a strong case for yourself, summarize your research plan, and describe research methodology. You can arrange items in this volume as follows:

- a. **The cover sheet**
This carries the title of the project, the project number, if any, and the name of your organization as the bidder.
- b. **A letter from the head of your organization**
In this letter, he will express the organization's interest in the proposal and its ability to commit funds and staff to it.

c. **An executive summary of the proposal**
This should ideally not be longer than five pages.

d. **The main body of the proposal.**
This will consist of several sections, which are discussed below.

12.3.1.1 Main body of the proposal: Sections 1, 2, and 3

In Section 1 you will try to communicate your understanding of the project and describe how the work is to be done. In Section 2, you are likely to describe your firm's capability to undertake the project, for instance, in terms of previous experience with similar projects. You may specify the qualifications of your proposed research staff in Section 3, and clearly indicate who will do what. It is helpful to propose primary as well as alternate candidates for all major jobs.

12.3.1.2 Main body of the proposal: Section 4

You will utilize this section for a description of research methodology. It is of particular importance in an economic research proposal to describe research methodology in some detail. You should: (a) specify the hypothesis--or alternative hypotheses--to be tested; (b) state whether primary or secondary data are to be used for the study; and (c) clearly indicate the methods to be employed for data analysis, such as time series analysis, regression analysis, linear programming, input/output models, or supply response models.

12.3.1.3 Main body of the proposal: Section 5

This section is your implementation plan, which is a time-step breakdown of proposed research activity, indicating the time required for each step in the total process. The implementation plan is often presented as a critical path programming chart showing an orderly sequence of events, inputs, and outputs in relation to the time required to complete each stage of implementation.

12.3.1.4 Main body of the proposal: Section 6

This section is optional. You can use it for a discussion of issues, if you

disagree with the methods suggested by the funding agency and are able to suggest a better or less costly way to achieve results.

12.3.2 *Volume 2*

Volume 2 is a collection of appendices which provide elaboration of, or documentary evidence in support of, statements made in Volume 1. Details such as bio-data of research personnel, and specifics of projects previously undertaken, are given here.

12.3.3 *Volume 3*

This volume relates to the financial management of the project, and contains a cost proposal. You should also demonstrate here that your firm has an established track record of managing projects and budgets of this size. It is important not to make your budget too fat--or too skimpy. An unrealistically low figure will suggest that you may not be able to perform satisfactorily, whereas a very high figure will hurt your chances of winning the contract. Be reasonable!

12.4 **Physical appearance of the proposal**

Be sure to use good quality paper: it helps to improve readability. The cover should not be cheap looking, nor should it be so fancy as to suggest wastage of money.

Volumes 1 and 3 should be kept to a minimum thickness while Volume 2, which contains full detail, may be thicker. However, only relevant and necessary material should be included here and overkilling must be avoided. For instance, it isn't a good idea to dress it up with photographs of the staff or of previous projects.

12.5 **Good writing and editing are important!**

A very important aspect of your research proposal will be how well it is written. Good technical writing and editing will determine to a great extent how effectively it communicates and the impression it creates. For this reason, many organizations engage professional writers for important proposals.

13. REFERENCES AND NOTES

13.1 Uses

The reasons for using references and notes are:

- a. to acknowledge borrowing from other writers and to document the source of a piece of information;
- b. to amplify points or provide additional information;
- c. to provide cross-references; and
- d. to define technical terms used in the text.

Text references are incorporated in the text itself. Footnotes are placed at the bottom of a page, while endnotes appear at the end of each chapter, or at the end of the entire work.

13.2 Parenthetical references

This type of reference is gaining increasing acceptance in the natural and social sciences because it eliminates the need for bibliographical footnotes and endnotes.

Parenthetical references are included in the main body of the text, enclosed within parentheses. They provide highly abbreviated bibliographical information and are keyed to a list of references or works cited, at the end of the book or article, where the reader can find detailed information. For this reason, a parenthetical reference can be used the very first time a reference is made to a listed source (unlike footnotes or endnotes where abbreviated information can be provided only for subsequent references). The highly abbreviated nature of the information provided in such a reference has the advantage of not disturbing the flow of text -- while letting the reader know where more detailed bibliographical information can be found, if required.

A parenthetical reference immediately follows the information it refers to as the source. Two types of parenthetical references are discussed below.

13.2.1 *Author-date system*

In a parenthetical reference of this type, only the last name of the author and the date of the publication are usually given. No punctuation is used between the name of the author and the publication date. However, if a page number is also given, the date is followed by a comma or a colon. The abbreviation "p." or "pp." is not used.

Examples

(Ahmed and Khan 1988)

(Ahmed, Jaffri and Khan 1988)

(Ahmed et al 1988)

(Ahmed and Khan 1988, 120-135) or (Ahmed and Khan 1988: 120-135)

13.2.2 *Number system*

Parenthetical references used in the number system give only a numeral within parentheses which is keyed to a numbered reference list. This system is not in common use.

13.3 **Footnotes and endnotes**

Footnotes have, in the past, presented the problem of determining exactly how much space is to be left at the bottom of each page for the notes. If the footnotes were long, or if there were several footnotes on a page, this required juggling with the text because footnotes must always be placed on the same page on which their reference numbers appear in the text. (The last note on a page may be *continued* on the next page, but must begin on the same page as its text reference.) With the introduction of microcomputer word processing and desktop laser printing, the exact amount of space required for footnotes on each page is automatically determined by the computer. Nonetheless, lengthy or numerous footnotes can result in an unattractive page: sometimes footnotes may take up more space than the text. In some cases, several long footnotes may have their text references toward the end of a page, making it impossible to begin them all on that page.

Endnotes do not present the problems described above. However, they are inconvenient for the reader who may have to keep turning to the end of a chapter, or the end of the text, to look at the notes.

Since computer technology is not widely employed for publication in Pakistan at the present time, it is often more convenient to use endnotes as against footnotes. In a book, or book-length work with several sections or chapters, put endnotes at the end of each chapter. In a shorter piece of writing, put all endnotes at the end of the text (see Chapter 2).

13.4 Numbering and placing

Each endnote (or footnote) is numbered. In journal articles or in short papers and reports the numbering is consecutive throughout the work. In books or in other book-length works, the numbering is consecutive throughout a chapter. Some writers number their footnotes consecutively throughout the text in books and long documents as well, but this can sometimes lead to long numbers and inconvenience in locating a desired footnote. In some scientific books, footnotes are numbered by page.

The following style is suggested: begin endnote (and footnote) numbers afresh with each new chapter in a book, or section of a book-length work, and number notes consecutively throughout the entire text in shorter documents. This is not a rigid rule. If a book-length work contains a few lengthy footnotes which are relevant to more than one chapter, these may be placed at the end of the work rather than at the end of individual chapters, and may be numbered consecutively.

Notes to tables, charts, graphs, or other illustrative material, are numbered separately from text notes (see 15.6.5).

13.5 Placing endnote and footnote numbers in the text

An endnote or footnote is indicated by an arabic superior number placed immediately after the quotation or other relevant statement in the text, without any intervening space. It is usually placed at the end of a sentence or at some other natural break in the sentence, and follows all marks of punctuation except the dash. The note number itself is not followed by a period, comma, or other punctuation.

Examples

It has been established by previous research that, as the price of chicken increases, the price of mutton also increases.¹

Examples (contd.)

He described it as "a dramatic new research finding"² which would revolutionize the earlier approach to the subject.

The research team found this to be an obvious conclusion³-- though it has not been so obvious in the past.

13.6 Style and content of notes

All items in a note should be run together in a single paragraph, wherever possible. Several sources documenting a single fact in the text should be separated by semicolons, the last one to be followed by a period.

The style and content of notes that refer to (a) books, and (b) periodicals are described below.

13.7 Notes that refer to books

The order of items for bibliographical citations for books is as follows:

- o Author's name (first name first)
- o One particular article in a collection (if relevant)
- o Title of the book cited, edition number if relevant
- o Publication facts -- city of publication, name of publisher, and year of publication
- o Page numbers

These items are discussed below.

13.7.1 *Author's name*

In both endnotes and footnotes the author's first name comes first, followed by the middle initial and last name. (This format is not followed in bibliographies. See Chapter 14). If there are more than three authors,

the name of the first author is followed by the phrase *et al.* (meaning "and others"). The name of the author is separated from the name of the title by a comma. (In bibliographies a period or colon is used.) In case an author's name is not given, but the name of the editor, translator, or compiler is given, this is placed first in the footnote, followed by the abbreviation *ed.*, *trans.*, or *comp.*, enclosed within commas.

If the book is published by an organization and the name of an individual is not given, the name of the organization, or the title of the book, may be given in place of the author's name.

13.7.2 *Portion of a book*

If a portion of a book is referred to (for instance, one particular article in a collection of papers), the name of the portion is enclosed within quotation marks. Italics are not used for a portion of a work. A chapter in a work by a single writer is not referred to in a footnote: the reference is to the work as a whole. The word "in" may be added before the title of the work to which the portion belongs.

13.7.3 *Title of the book*

Each word of the title is capitalized, except articles and short prepositions. (This is known as headline style capitalization.) The title is printed in italics. If the work is not the first edition, the edition number is given, following the title, in abbreviated form such as 3rd ed. or rev. ed.

13.7.4 *Publishing data*

The city of publication, publisher's name, and year of publication are usually placed within parentheses. A colon separates the city from the publisher, and a comma separates the publisher from the year of publication. (Keep in mind that the printer is not necessarily the publisher.)

13.7.5 *Page numbers*

The number of the page (or numbers of the pages) on which the information referred to can be found is given last. The page number is usually preceded by the abbreviation 'p.' or 'pp.'. Page numbers are placed

outside the parentheses containing publication facts. A comma (or colon) is given after the last parenthesis.

13.8 Notes that refer to periodicals

The order of items in an endnote or footnote that refers to a periodical is as follows:

- o Author's name (the style is the same as in references to books)
- o Title of article (the style used is the same as for a reference to a portion of a book)
- o Name of periodical (the style used for book titles is followed)
- o Volume and number of periodical
The volume number comes first. It is not necessary to write the word "Volume" or Vol" but if the issue number is given, this is usually preceded by the word "No."
- o Date of publication
The year of publication of a periodical (and often the month or seasonal designation as well) is given within parentheses following the volume and issue number.
- o Page number
As in the case of book references, the page number(s) come last, preceded by a colon or a comma.

13.9 Examples (books and periodicals)

Some examples of notes containing citations for books and for periodicals are given below.

Books

Arif Ahmed, *Introduction to Rice Cultivation* (Karachi: Readwell Publishers, 1987), pp 150-175.

Aftab A. Qureshi, "New Rice Varieties." *Rice Cultivation*, ed. Nusrat Shah (Karachi: Readwell Publishers, 1988), p. 50.

Examples (contd.)

Yusuf I. Khan et al. *Growing Better Cotton* (Pakistan Cotton Institute, 1988), pp. 120-200.

Periodicals

Fazal A. Chaudhry, "Experiments in Rice Cultivation," *The Farmer* 27, No. 4 (April 1988): pp. 10-15.

13.10 Indentation

Footnotes and endnotes are indented in various ways. The style suggested here is as follows: set the footnote reference number flush left (in line with the left margin of the text) and, after the period following the number, indent three spaces. All subsequent lines will be indented so as to begin directly under the first letter of text in the first line.

Example

1. Asif Khan, "Macroeconomic Linkages, Taxes, and Subsidies in the Pakistan Agriculture Sector," *The Farmer*, 27, No.4, (August 1987): pp. 10-15.

Other methods of indenting footnotes and endnotes are also common. Two examples are given below.

Examples

1. Asif Khan, "Macroeconomic Linkages, Taxes, and Subsidies in the Pakistan Agriculture Sector," *The Farmer*, 27, No. 4, (August 1987): pp. 10-15.

1. Asif Khan, Macroeconomic Linkages, Taxes, and Subsidies in the Pakistan Agriculture Sector," *The Farmer*, 27, No. 4, (August 1987): pp. 10-15.

13.11 Subsequent references (abbreviated footnotes)

While footnotes and endnotes provide full biographical information for a source the first time it is cited, in subsequent references this information

is provided in an abbreviated manner. The name of the book and the page number alone can be given in a subsequent reference (if the author's name has been mentioned in the running text) or the last name of the author, the name of the book, and the page number (if the author's name has not been mentioned in the running text).

13.12 Non-bibliographical footnotes and endnotes

Some endnotes and footnotes are used not for bibliographical citations but to provide additional information or comments. Such notes are keyed to the text in the same way as bibliographical notes (see 13.5).

13.13 Latin abbreviations

Some writers prefer to use traditional Latin abbreviations in references and notes, and this is acceptable in technical writing. Traditionally, Latin abbreviations have been italicized and this is still the most commonly used style although there now appears to be a trend, in the natural sciences in particular, to use ordinary roman type in place of italics.

Use the Latin abbreviation *ibid.* (meaning "in the same place") when referring to the work cited in the immediately preceding footnote. If you do not give a page number, you are also referring to the page number cited above. The abbreviation may be used several times in succession.

The abbreviations *loc. cit.* ("in the place cited") and *op. cit.* ("in the work cited") are used only in conjunction with the author's name. When you cite a book or a periodical, give its complete title the first time. You may substitute *loc. cit.* or *op. cit.* for the title in subsequent references.

Use *loc. cit.* only when referring to the same page or pages of the source cited earlier, and *op. cit.* when referring to the source cited earlier, but not to the same page or pages of that source.

Cf. means "compare" -- and not "see also." It is capitalized only if it begins a sentence or a note (which may or may not be a complete sentence). It is not italicized.

When a work has more than three authors, the name of the first author is followed by the Latin abbreviation *et al.*, meaning "and others."

14. BIBLIOGRAPHIES

14.1 "Bibliography" and "List of References"

A Bibliography (or Select Bibliography) is a list of all the works, or the major works, you have found relevant in writing your text -- whether you have referred to them specifically or not. A List of References (also called Works Cited, or Literature Cited) includes only works that you have actually referred to in the text. In other respects, bibliographies and lists of references are similar. They are both placed at the end of the text, before the appendices and the index. (See also 2.2.)

14.2 "Flush and hang" style

A "flush and hang" style is traditionally used for a bibliography or reference list. The first line of each item is set flush with the left margin, with subsequent lines indented under it. (For examples, see 14.8.)

A bibliographical listing always begins on a new page. Entries are arranged alphabetically, according to the *last* names of authors. If no author is given, the editor or compiler's name, the title of the work, or the name of the sponsoring organization, may be used instead. Entries need not be numbered unless the number system of parenthetical references is used in the work (see 13.2.2).

14.3 Bibliographic entries and note entries

Although the elements included in a bibliographic entry are the same as in a footnote or endnote (see 13.7 and 13.8), there are some differences in style which are discussed in this chapter.

14.4 Books

14.4.1 *Name of author*

In a footnote, the author's first name comes first, whereas in a bibliography the author's last name comes first. If a piece of writing has more than one author, only the name of the first author is generally reversed. However, the style used in some scientific and technical writing is to

give the last names of all authors followed by their first names and middle initials (or the last names followed only by initials). In Pakistan, the use of initials in place of full names may be confusing since many commonly occurring last names are followed by similar initials. To avoid confusion, the following practice is advocated:

- o for the first author, give the last name followed by the first name and middle initial;
- o for other listed authors, give the first names followed by middle initials and last names.

If more than one works by the same author are listed, a long dash (---) is used in place of the author's name after the first listing.

The names of all authors are generally listed, even if there are more than three authors (for the use of *et al.* in text notes, see 13.13.)

If the name of the author is not given, the name of the editor, compiler, or translator is given instead. The abbreviation ed., comp., or trans. is placed after the name, preceded by a comma.

If the name of an author is not given in a publication issued by an organization, the name of the organization is used in the listing. It is acceptable to repeat the name of the organization as the publisher. Where neither individual author nor corporate author is given, the title of the publication will be the first item in the entry.

14.4.2 *Title of the publication*

The title is italicized and capitalization is headline style (with initial letters capitalized, except articles and short prepositions). Also see 14.9.

14.4.3 *Portion of a book*

The same style is used as in footnotes.

14.4.4 *Date of publication*

See 14.4.5.

14.4.5 *Publication data*

In a bibliography or list of references, publishing data are not enclosed within parentheses but are preceded by a period. The city name is usually followed by a colon, and the publisher's name by a comma, followed by the date. The entry ends with a period after the date.

14.5 *Published reports*

These are listed in the same way as other books (see 14.4 and 14.8.)

14.6 *Journal articles*

The name of the article is given within quotation marks, and the name of the journal in italics. The number and date of the periodical are cited as in 13.8 (also see 14.8).

14.7 *Unpublished reports and theses*

The author's name is given first, in the same style as used in entries for books and newspaper articles; it is followed by the name of the work, enclosed within quotation marks. The third entry describes the nature of the document, for instance, that it is a report written for an organization, which is identified. (If the name of the author is not given, the name of the organization is the very first entry.) Other information which may be necessary to identify the document is also included, such as an official identification number. Finally, the city in which the publishing institution is located and the date of compilation are listed.

14.8 *Examples*

Books

Ahmed, Naim A.; Iqbal S. Qasim; Afzal U. Qureshi; Sakina Khan. *Soil Ecology*. Peshawar: Khyber University Press, 1987.

[Note: As explained above, it is also possible to reverse the names of all the authors, and to give only their last names and their first and middle initials.]

Bangash, Masood. A. *Post Harvest Losses of Foodgrains in Pakistan*. Quetta: Bolan Publishers, 1979.

----. *Techniques of Economic Policy Analysis*. Islamabad: Pakistan Institute of Economic Analysis, 1987.

Corporate author

Ministry of Food, Agriculture, and Cooperatives, Government of Pakistan. *Feeding Systems for Livestock*. Islamabad: Ministry of Food, Agriculture and Cooperatives, 1975.

Editor in place of author

Rahim, Inam U., ed. *Guide to Economic Policy Analysis*. Islamabad: Pakistan Institute of Economic Analysis, 1988.

Title of work as first entry

Major News Events of 1988. Multan: News Foundation, Inc., 1988.

Unpublished report

"The Problem of Waterlogging: Some Solutions." Report prepared for USAID, Islamabad, December 1988. Photocopy.

Periodicals

Khan, Rahman, A. "Problems of Saline Soils." *The Farmer* 15, No.4 (December 1988): pp. 10-15.

14.9 Other styles

A somewhat different bibliographical style from that presented above is occasionally used in the natural sciences and in other heavy technical writing. It differs from the more widely accepted style in the following ways: only the last names of authors are given, along with their initials; the date is placed near the beginning of the entry (following the author's name); less capitalization and more abbreviations are used; and the title of an article is not enclosed in quotation marks. In both styles, a period is used after each major item of an entry, such as author's name, title, and publication data.

15. GRAPHIC AIDS

15.1 Purpose

The purpose of graphic aids is: to add emphasis; to provide conviction; to make the text more appealing (and hence more readable); and to demonstrate relationships--a vital part of most technical writing. Graphic aids can effectively illustrate relationships between different factors or entities, relationships over time, and relationships among several variables over time. They have an important use in summarizing a factual position by presenting statistical and other data in a compact and easy to grasp manner, thus facilitating the communication of complex ideas.

15.2 Types of graphic aids

Many types of graphic aids can be used to illustrate your text--charts, graphs, drawings, diagrams, and photographs. A graphic aid can be a simple table with a few columns, or an intricate chart illustrating complex relationships. The graphic aids used in technical writing can be broadly grouped into two major categories: (1) tables, and (2) figures. Tables are lists of data--usually statistical data--arranged in rows and columns. All other graphic aids are classed as figures, including graphs, diagrams, and charts.

15.3 Effective use of graphic aids

Too many visuals clutter up the text instead of supporting it. A very complicated visual often fails to communicate effectively, and a visual that is too ornate frequently looks frivolous. Be judicious in the use of graphic aids, keeping in mind that the ultimate objective is not to demonstrate your skill in making fancy visuals, but to put across your ideas as clearly, concisely, and as convincingly as possible.

15.4 Placement of tables and graphs

An effective graph or table must be meaningfully related to the discussion in the text, and must be placed reasonably close to the first text reference to it. The graphic aid should be appropriate to the discussion, should be completely labeled, and should be easy to understand.

15.5 Numbering

In technical and scientific writing where the text is divided into chapters or sections, and also in textbooks and reference books, it is convenient to give double numbers to tables as well as to figures: the number of the chapter or section, a decimal point, and the number of the table or figure. Tables are numbered separately from figures: you may thus have Table 1.1 and also Fig. 1.1 in your first chapter or section.

15.6 Tables

The components of a table are described in the following subsections and are illustrated in the example table on page 85.

15.6.1 *Caption (number and title)*

The style and positioning of the table number and title are quite variable and different styles are followed by writers. The style suggested here is to set the table number (ending in a period) flush left, followed by the title on the same line, with a gap of a few spaces between the two. If the title is more than one line in length, the second line will begin under the initial letter of the first line.

The title is capitalized in headline style: the initial letters of all words except coordinating conjunctions, articles, and short prepositions are capitalized. It is not followed by a period. Boldface style is usually employed for the number and the title.

Some writers prefer to place the table number and title on separate lines, both set flush left. Others center the table number and title, on separate lines. In both these cases, periods may or may not be given after the table number. No period is required after the title.

Examples

Table 15.1. Production of Farm Eggs in Karachi, 1986-87

Table 15.J. Production of Farm Eggs, Beef and Mutton in Karachi, Lahore, and Rawalpindi, 1986-87

Table 15.1 Livestock Population in Pakistan, 1984-85
(Numbers in thousands)

Identification number

Title

Subtitle

Spanner head

Spanner head

Stub head

Column heads

Distribution	Buffaloes		Cattle	
	Numbers	Percent	Number	Percent

Milch Animals

Cut-in head

Stub subheads	Stub items	3 Years and Over		Less than 3 Years		Total
		Milking	Dry	Not Calved		
		4414	41	2714	37	
		2107	19	2036	38	
		891	8	424	6	
		3450	32	2164	29	
		10862	100	7338	100	

Male Animals

Stub subheads	Stub items	3 Years and Over		Less than 3 Years		Total
		Breeding	Draught	Others		
		51	2	88	1	
		202	9	6674	70	
		21	1	155	2	
		1941	88	2494	27	
		2215	100	9211	100	

Cow

Source: Agricultural Statistics of Pakistan, 1985

Note: Percentages have been rounded off.

Notes

15.6.2 *Subtitles*

If necessary, a subtitle may be used to explain briefly certain elements in the table such as units of measurement, limitations in the data, or how the data were obtained. The subtitle is enclosed within parentheses and is set flush left or is centered, depending on the style used for the main title. Lowercase letters are used for the subtitle. Some common examples of subtitles are given below.

Examples

(in thousands)
(1984 = 100%)
(in percentages)

15.6.3 *Column heads and stubheads*

The leftmost column in a table, which lists independent variables or items under consideration, is known as the stub and the heading over this column is called the *stubhead*. This is the only column head which is optional and which may not be given if it is obvious. All other columns must have heads. A *spanner head* may also be required in some tables. A spanner head applies to two or more columns and is set above their individual heads. A *cut-in head* cuts across the statistical columns of a table and applies to all the tabular matter below it.

Column heads are single words or concise phrases, set in roman type. The initial letter is capitalized. (Some writers prefer headline style capitalization.) Do not use a period after a column head. If the table number and the title (and subtitle, if any) have been set flush left, set the column heads flush left as well. Spanner heads and cut-in heads are, however, centered above the columns to which they pertain.

When a column head has no meaningful application to a particular cell, the abbreviation N/A or N.A. is written in this cell to indicate that the data do not apply in this particular case.

15.6.4 *Alignment of column entries*

The columns of a table must be precisely aligned, both vertically and horizontally, without which the data would be hard to comprehend.

Each item listed under the stubhead must be carefully aligned with the row to which it relates. If a stub item requires more than one line, corresponding items in the other columns are generally aligned with the runover line of the stub item, and not the first line.

Vertical alignments in individual columns is also very important to enable a reader to immediately locate an item under a particular column head. When aligning figures vertically in each column observe the following rules:

- o if the figures are whole numbers, align their last digit at the rightmost edge of the column;
- o if the figures include common fractions, align them by the rightmost whole digit;
- o if the figures are decimal numbers, align them by the decimal point;
- o when rupee amounts are listed, zeroes are not required if all of these are whole rupee amounts but if any of the amounts contain paisa figures, decimal points and zeroes must be added to the whole-rupee amounts;
- o align inclusive numbers (such as 20-30, 5-10) on the internal hyphen;
- o when aligning figures which have mathematical signs on their left, align the figures vertically, not the mathematical signs.

15.6.5 *Footnotes*

Footnotes are placed just below the table and, if possible, are set in smaller type than that used in the table. Footnotes will begin flush against the left margin. The first note below the table is usually a source note, and it may simply be introduced with the word "Source." A source note is required when the table is reprinted from another source or when the author has used data from another source to create a new table. (It is important to remember that the use of copyrighted material requires the author's written permission.) If there are any other notes, they follow the source note. Every note ends with a period, although the source note does not need a period unless it is a complete sentence.

If the table has a single general note that pertains to information presented in the table as a whole, this can simply be introduced with the word "Note" (in italics) and need not be numbered. If the table has several general notes, they should be run together as a single paragraph introduced by the word "Notes." Any note applying to the table number or title will be a general and not a specific note.

Specific footnotes are introduced by superior letters, or symbols, corresponding to such letters or symbols placed after items in the table that need some comment. Each specific footnote begins on a separate line. Table footnote numbers are always separate from text footnote numbers.

15.6.6 *Use of "landscape" mode*

If a table is wider than it is long, you may employ the "landscape mode" offered by many microcomputer graphic programs and print it broadside. A table printed broadside is governed by the following rules: it reads from the bottom of the page to the top, and the title runs vertically along the left side of the page, from bottom to top.

15.7 **Figures**

The most commonly used figures in technical writing are graphs and charts, and we will concern ourselves only with these.

15.7.1 *Numbering of figures*

Figures are numbered separately from tables. The numbering system is the same as for tables (see 15.5), with the word "Figure" replacing the word "Table." One of two alternative styles of writing the figure number and the title may be used, depending on space and other considerations: (a) write the word "Figure" in full, followed by the number, and write the title on the following line, or (b) abbreviate the word "figure" as "Fig." (the entire word or only the initial letter may be capitalized) and give the title on the same line, with a period and a few spaces between the figure number and the title.

Examples

Figure 1.5
Egg Production in Sind, 1985-87

Figure 1.5. Egg Production in Sind, 1985-87

Fig. 1.5. Egg Production in Sind, 1985-87

FIG. 1.5. Egg Production in Sind, 1985-87

15.7.2 Title

The title of your graph or chart should be descriptive, but brief. Use headline-style capitalization, and do not end the title with a period (unless it is a complete sentence). The title may be followed by a subtitle (within parentheses, and usually on a separate line) which further describes the data or indicates the type of measurement used.

15.7.3 Footnotes

The style for footnotes in figures is the same as the style for footnotes in tables (see 15.6.5).

15.8 Integrating figures and text

A visual aid should be placed as close as possible to the place where it is mentioned in the text. Modern computer software has simplified the task of preparing graphs and charts, and many different types can be made and incorporated in your text within a matter of minutes. The various figures shown in this section have been created using Lotus and other graphics software, and were incorporated in the text using the "Inset" program.

15.9 Types of charts

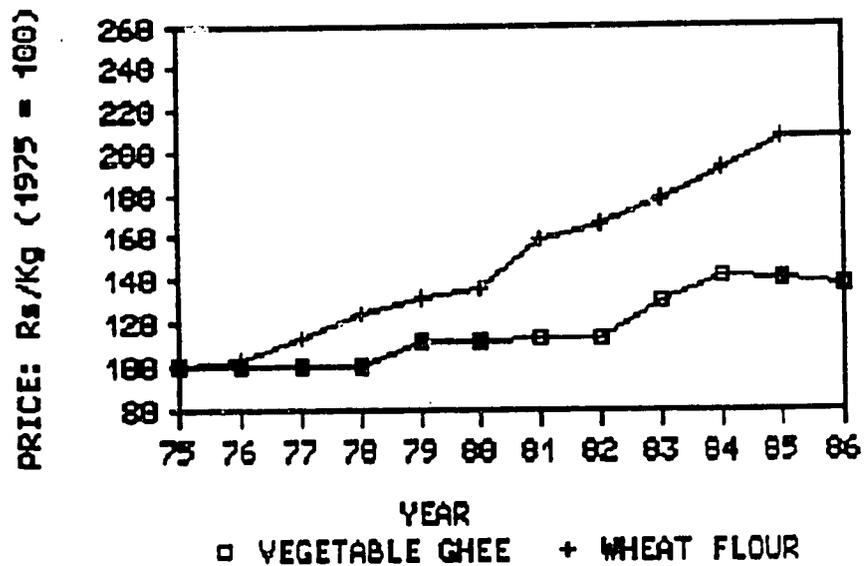
The type of chart you will use at a particular place in the text will depend on what you wish to communicate to your reader. Some commonly used charts and their uses are discussed on the following pages.

15.9.1 Line chart

The most important use of a line chart (Fig. 15.1) is to accent a trend, for instance, a rise or fall in the price of a commodity, or of more than one commodities, over a period of time. Line charts are also used for forecasts, interpolations, and extrapolations. Although any number of lines can be compared on the same chart, too many lines may create confusion, which defeats the very purpose of having a graph.

A reference line of zero or some other value can be included in the chart.

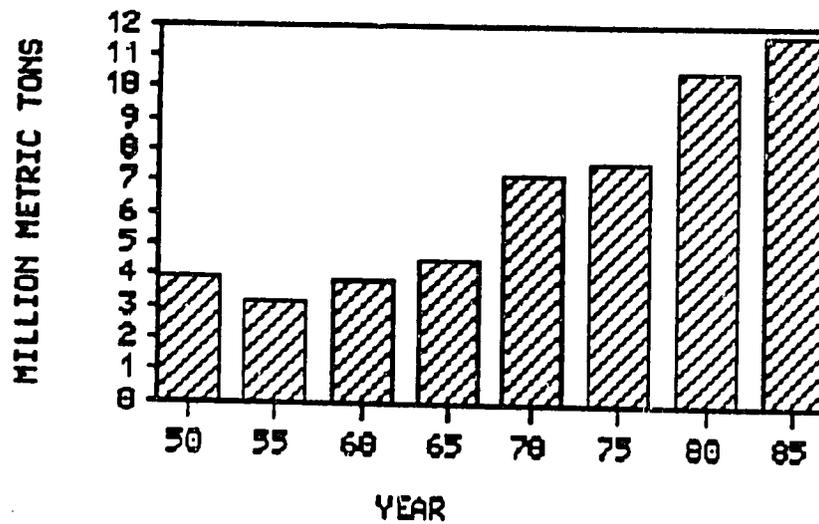
Figure 15.1
Average Retail Prices, 1975-1986
(Rs. per kg)



15.9.2 *Vertical bar chart*

Differences in time series data can be effectively demonstrated by means of a vertical bar chart (Fig. 15.2), for instance wheat production in different years. To emphasize a *trend*, however, a line chart should be used rather than a bar chart.

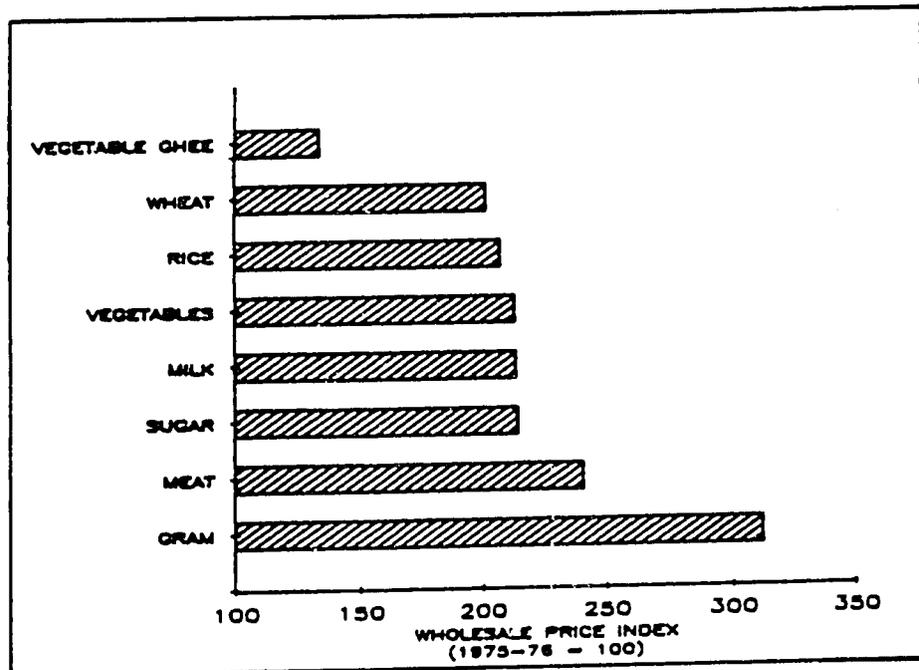
Figure 15.2
Pakistan Wheat Production, 1950-85
(in millions of metric tons)



15.93 *Horizontal bar chart*

Differences between sets of data at any given time (rather than over a period of time) can be emphasized by means of a horizontal bar chart (Fig. 15.3), such as the wholesale prices of various food items during the same period of time. The bars are stacked in some logical sequence, such as alphabetical, geographical, numerical, or according to size (in order of decreasing or increasing length).

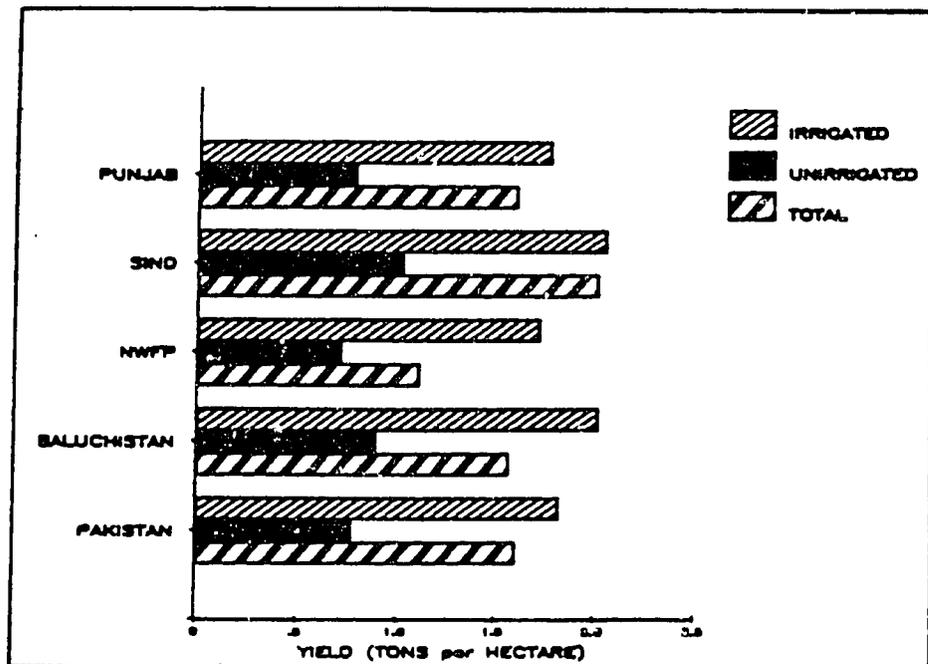
Figure 15.3
Pakistan Wholesale Food Prices, 1986-87



15.9.4 Grouped bar chart

To compare several items over a period of time or in different locations or conditions, a grouped vertical bar chart or grouped horizontal bar chart (Fig. 15.4) is effective. An example of the use of such a chart would be a comparison of wheat yields in the various provinces, under irrigated and unirrigated conditions. The number of grouped columns should not exceed three, as the comparison of more than three items by means of a grouped bar chart tends to be confusing.

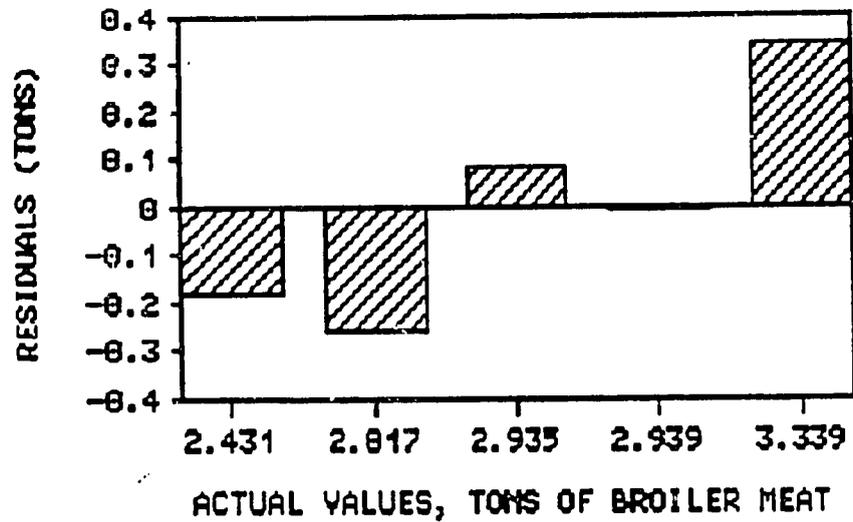
Figure 15.4
Pakistan Wheat Yield, 1984-85
(Tons per hectare)



15.9.5 Deviation bar chart

Deviations above and below a reference line, such as profits and losses, can be emphasized through a deviation bar chart. This type of chart is also very useful for regression models (Figure 15.5). In a vertical deviation bar chart, columns below the reference line indicate negative values. In a horizontal deviation bar chart, negative values are indicated by bars to the left of the reference line.

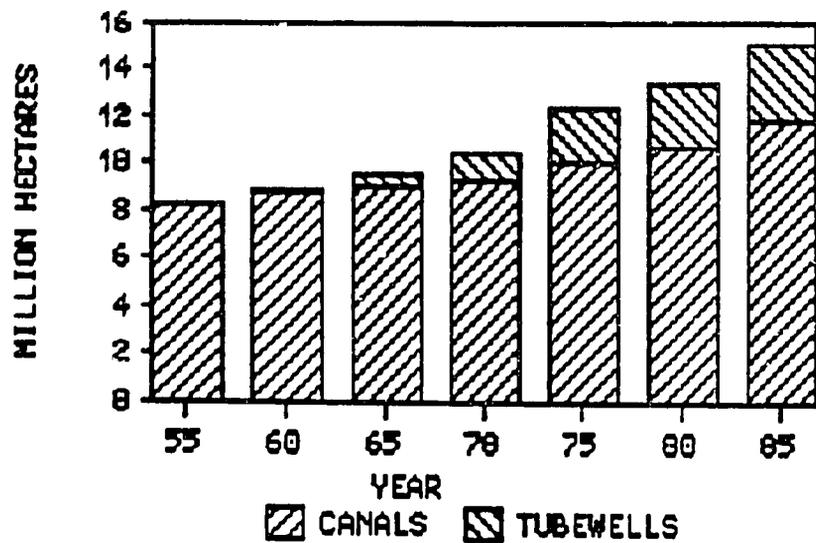
Figure 15.5
Regression Model Goodness of Fit
(Residuals = Actual-Fitted Values)



15.9.6 Stacked bar chart

Absolute values can be compared on a stacked bar chart (Figure 15.6). This type of chart allows you to show two or three quantities for each item you are representing (for instance, land areas irrigated by canals and tubewells respectively), or two or more different aspects of the same item. Such charts are utilized to give a general picture and should not be used where accuracy is desired. Although the totals are easy to compare, the individual quantities are not, except for the lowest band. The precise quantities of other bands are not readily apparent, and may be derived only through calculation.

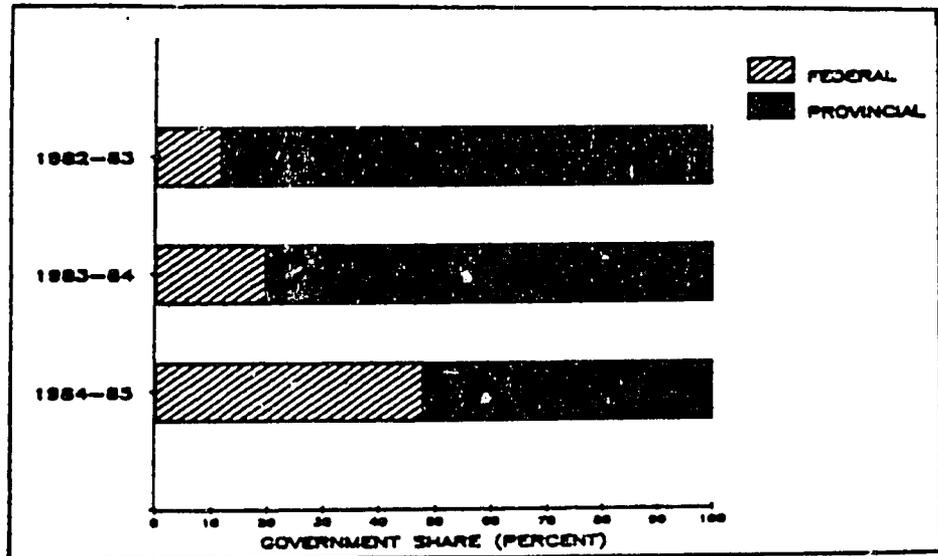
Figure 15.6
Pakistan Irrigated Area, 1955-1985
(Millions of hectares)



15.9.7 *The 100 percent chart*

It may not be possible to compare absolute values using a regular bar chart where absolute differences are large, as between the output of a small, cottage-type industry and a large commercial manufacturer. In such cases a more meaningful picture can emerge through a chart showing percentages, rather than absolutes. Charts of this type are known as 100 percent charts (Fig. 15.7). The bars can be either vertical or horizontal. Such charts are also useful in showing the relative proportions of the various elements that constitute the total item (100 percent), such as the shares of the federal and provincial governments in total spending on a given item.

Figure 15.7
Pakistan Wheat Subsidies by Government Share, 1982/83 - 1984/85
(Federal and Provincial)

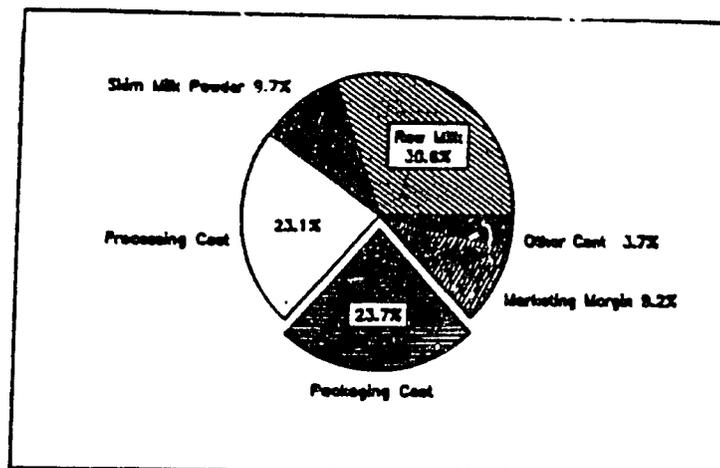


15.9.8 Pie chart

Percentages can also be compared by using a pie chart (Fig. 15.8). In a pie chart, sectors are arranged clockwise. The conventional method of presenting a pie chart is to start the largest sector at 12 o'clock, followed by progressively smaller slices (although a slice labeled "other" is always placed last, regardless of size). However, the advent of computer graphics has necessitated a relaxation of the conventional pie chart rules. In many cases, the labeling restrictions of computer programs would cause visual confusion if the conventional rules were observed and some computer graphics programs do not allow observance of the 12 o'clock pie chart rule.

A pie can be "exploded" to emphasize any one segment. Try not to use more than five segments. If you wish to compare more than five segments, it is better to use a table instead.

Figure 15.8
Ultra-High Temperature Milk Production Costs, 1987



16. PAGE FORMAT

16.1 What is page format?

The term "page format," as used here, means the appearance of individual pages of a document. The appearance of a page is determined by features such as margins (top, bottom, left, and right), line spacing and other spacing within the text, indentation, special printing effects (such as boldface or italics), and the arrangement of text on the page.

16.2 Using microcomputer software

Numerous word processors are now available which enable you to format your page the way you wish. Some default settings are offered by the program, which may be acceptable to you or which you can change with simple commands. Many computer-based mechanical printers, in particular, laser printers, have the capability to handle a variety of typefaces.

16.3 Margins

The size of margins depends on several factors, including the size of paper and the typeface you will be using; only some general rules are suggested here. Long lines of text, with narrow margins on left and right are not pleasing to the eye, and hinder "smooth" reading. On the other hand, too much white space can also create a disagreeable effect. Generally speaking, when you use a word processor, each line of text should contain 65 characters (out of a total of 80 characters which constitute the total width of a standard page). Many writers choose a left margin of 10 spaces (allowing five to be taken up in the binding) and a right margin of 5 spaces. The bottom margin is almost always wider than the top margin. Since there are 66 lines to a standard (8"x11") page, and generally 54 lines are used for the text, this leaves a total of 12 lines for the top and bottom margins. You may decide on a top margin of five lines, and a bottom margin of 7 lines. A publication such as a small pocket handbook or dictionary, with much text to fit on a limited number of pages, may choose narrower margins, whereas a publication of larger dimensions and more limited text may have wider margins. The *proportion* of the width of the text area to its depth is what is most important: a "square" look or an elongated appearance are both to be avoided. In making a decision, you may find it helpful to look at some standard

publications similar to yours in size, typeface, and content. You can also experiment: try out margins of different sizes for one or two pages of your text, and decide which is most readable and pleasing in appearance (without ignoring the conventional proportion between type page width and length).

16.4 Justification and word breaks

Text is said to be justified when the lines are adjusted to be all the same length, so that both the left and right edges are neatly aligned (the left edge is always aligned, even when text is not justified). To avoid large and unseemly white spaces between words, it is best to use hyphenation when you decide to justify your text. However, some extra white spaces will still remain and there is also the problem of determining suitable word breaks at the ends of lines. Many word processing programs are able to provide automatic hyphenation, but the writer frequently prefers to provide his own guidance in this area.

A word division always comes at the end of a syllable; hence single syllable words (such as *work*, *wheat*, or *rice*) cannot be divided. A dictionary will help you in determining the syllables of a word, but not all syllable breaks are good word breaks at the ends of lines. Two systems of word division are in common use: the American system, which uses pronunciation as the criterion for word division, and the British system, which uses word derivation as the criterion. The two systems are illustrated below.

American

infor- mation
knowl- edge
conser- vation

British

inform- ation
know- ledge
conserv- ation

Most words, however, are divided in similar fashion under both systems, such as the following:

para- graph, under- line, contain- ing, how- ever

To avoid the problems created by justification, some publishers and writers now prefer not to justify text but, instead, to leave the right edge ragged. Although most printed material is still justified, ragged

typesetting is gaining increasing acceptance. Its advocates also claim that it has greater readability.

16.5 Word break at the end of a page

Many writers and publishers insist that a word should not be broken if it is the very last word on a page, in particular a right hand page. However, numerous exceptions to this rule are to be found -- even in style manuals which advocate observance of the rule! A practical guideline suggested here is to avoid dividing a word at the end of a page as far as possible, while keeping in mind that in a few cases this may be unavoidable.

16.6 Main heads and subordinate heads

Numerous printing styles are in use for main headings and subordinate headings, as discussed in 9.8, page 56. When the decimal system of outlining is used, the space between the decimal number and the heading also varies in different publications, depending on the page size of the document, and the typeface used.

It is important to follow a consistent pattern of positioning and capitalizing headings of different values throughout a document -- section (or chapter) headings, subheadings, sub-subheadings, and headings of a still lower level, if these are used. (It is preferable not to use more than three levels. See 4.2, page 25.) Practically all computerized printers allow the use of boldface and italics. You may thus decide to have your main headings in all capitals, using boldface print. Uppercase and lowercase letters can be used for subheadings, again employing boldface. Sub-subheadings can be in italics, or may be underlined. If underlining is used for some other purpose, sub-subheadings can be indicated by the absence of any added emphasis, as in this manual. Whatever style you decide to use, the main objective will be to clearly indicate the various levels of your headings.

With regard to the number of spaces between the decimal number and the words of a heading, the general rule to follow is to leave enough space so that a long decimal number will still be separated by some white space from the first letter of the heading. In this book, the chapter heading is centered, and four spaces are given following the decimal point. For all

subordinate headings, 10 spaces are given between the first digit of the decimal number and the first letter of the heading.

16.7 Subhead at the bottom of a page ("orphan")

A subhead (or any other heading) must never be the last line of a page. (This is sometimes referred to as an "orphan".) The accepted rule is that the heading must be followed by at least two lines of text, (though a few authorities are content with a single line).

16.8 "Widows"

The first line of a page should, ideally, be a complete line. In any case, it should not consist of just a single word, or even two or three short words. A short, incomplete line at the top of a page is termed a "widow" in printer's jargon.

16.9 Page numbers

Several different locations on a page are acceptable for the page number. If numbers are given at the top of each page, the most common position is flush outside – aligned with the left edge of the text on left hand, or verso, pages and with the right edge on right hand, or recto, pages. The page number can also be given at the bottom of the page, as in this manual. Here, again, you can either choose the flush outside position, or you can center the number. Another possible position for the page number is indented from the two edges. Different word processors will give you a different range of choices.

17. PROOFREADING

17.1 Finally, a word about proofreading!

Most writers and editors have to do some proofreading, routinely or occasionally. In Pakistan, it is particularly important for a technical writer to be a good proofreader because: (a) computer technology, including laser printing which eliminates the need to correct press proofs, is not yet widely available, and (b) few presses are likely to have proofreaders who are sufficiently familiar with scientific and technical terms to avoid making typographical errors. If you have taken pains to write a good report, make sure it is not ruined by errors made in printing.

17.2 How to mark your corrections

Certain proofreaders' marks are universally used and recognized. You should use these marks when correcting proofs from the press. Always mark your corrections in the margin. The left and right margins are both used. Mark each correction next to the line of type in which it is required, and place a corresponding mark within the line to indicate the place where the correction is to be made: a caret indicates an addition, while a line put through a letter or word means it is to be deleted. Never mark a correction within the text without any indication in the margin: the typesetter looks only at the margins and, if corrections are not indicated here, will not look for them in the text.

When numerous corrections have to be made in a few lines, it is better to cross out the entire passage and re-write it correctly in the margin. If there isn't enough space here, type out the correction or addition on a separate slip of paper and fasten it securely to the proof. Make a note on the margin and a caret in the line to show where it will go. Also, make a note on the slip to show where it goes in the text.

17.3 Proofreaders' marks

A list of proofreaders' marks commonly used in Pakistan is given on the following page.

PROOFREADERS' MARKS

∩ or ∪ or ∩	delete; take it out
⊖	close up; print as <u>one</u> word
⊖	delete and close up
^ or > or ^	caret; insert here (something)
#	insert space
eg	space evenly ^ where indicated
set	let marked text stand as set
↔	transpose; change/order (the)
[set farther to the left
]	set farther to the right
≡	straighten alignment
	straighten or align
x	imperfect or broken character
¶	begin a new paragraph
Ⓟ	spell out (set 5 lbs as five pounds)
cap	set in <u>capitals</u> (CAPITALS)
sm cap or s.c.	set in <u>small capitals</u> (SMALL CAPITALS)
lc	set in <u>lowercase</u> (lowercase)
ital	set in <u>italic</u> (italic)
rom	set in <u>roman</u> (roman)
bf	set in <u>boldface</u> (boldface)
√	superscript or superior (3 ² as in x ²)
^	subscript or inferior (2 ₂ as in H ₂ O)
∩	comma
∩	apostrophe
; or ;/	semicolon
: or Ⓢ	colon
Ⓢ or Ⓢ	quotation marks

17.4 Examples of corrected proofs

Examples of two corrected proofs are given below.

Prospects and Some Policy Problems

Chinese agriculture prior to the late 1970s is]]

(o) widely perceived to have major shortcomings. The growth of
 tr output and of ~~per~~ income was quite modest. productivity growth e/s
 (o) was negligible at best, and per capita consumption ~~consump~~ l/c/c
 (o) [~~tion~~ of food apparently suffered a slight decline. Since 1978, by wf/cap
 (o) contrast, incomes have increased.

Inverted Pyramid Style

The inverted pyramid format is what you ~~you~~ find in (o)

(o) most newspaper reports: the important news is presented first
 (o) in this type of story. A report written in the inverted pyramid tr
 (o) style puts conclusions and recommendations near the beginning. (o)
 (o) The main body of the report, the appendices, the bibliography, ' ,
 (o) ~~the bibliography~~, and the indexes follow. The main / difference less #
 (o) between this type of report and the building block type is that tr
 (o) here the conclusions and recommendations are first presented (o)

The report cited in 3.3 above is an example of a building
 (o) block format can be changed to an inverted pyramid format by #/t

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