RESEARCH METHODOLOGY

WEEK 2 & 3: DEFINING RESEARCH OBJECTIVES AND HYPOTHESIS

What Is a Research Objective?

- The objectives of a research project summarize what is to be achieved by the study
- Should be closely related to the statement of the problem
- General objectives states what is expected to be achieved by the study in general terms

Specific Objectives

- These are a breakdown of the general objectives
- Systematically address the various aspects of the problem
- Should specify
    - What will you do in study- "it"
    - Where you will do it
    - Why will you do "it"

How Should You State Objectives

Use words that are specific enough to be evaluated

- *to determine,*
- *to compare,*
- *to verify,*
- *to calculate,*
- *to describe,*
- *To establish.*

Avoid use of vague non-action verbs such as

- to appreciate
- to understand
- to study

OBJECTIVES MUST BE SMART

- Specific
- Measurable
- Achievable/attainable
- Realistic
- Time bound

HOW TO WRITE SMART OBJECTIVES

An objective is a clear statement of something that needs to be accomplished over a period of time. SMART objectives are:

- *Specific* – states exactly what you need to achieve
- *Measurable* – includes a quality or quantity measure
- *Achievable* – able to attain the objectives(knowing the resources and capacities at the disposal of the community);
- *Realistic*– can be challenging but must be achievable
- *Time bound* – with a clear end date or timescale

WHY SHOULD RESEARCH OBJECTIVES BE DEVELOPED?

The formulation of objectives will help to:

- Focus on the study activities
- Avoid collection of data that are not strictly necessary for understanding and solving the problem you have identified.
- Organize the study in clearly defined parts or phases.
- Properly formulated, specific objectives will facilitate the development of your research methodology
- Help to orient data collection
- Facilitate data analysis
- Facilitate interpretation and utilization of results

HYPOTHESIS

- A statement of the problem which is said in a testable form
- This will help us develop an analysis plan
- It also helps to develop your variables (questionnaire.)
- Should be explicitly stated
  - include study design,
  - population, study factors and
  - outcomes to be measured etc in one sentence

FORMULATING RESEARCH PROBLEMS

What is a Research Problem?

A research problem, in general, refers to some difficulty which a researcher experiences in the context of either a theoretical or practical situation and wants to obtain a solution for the same.

A research problem must meet the following conditions:-

- ✓ There must be an individual or a group which has some *difficulty* or the *problem*.
- ✓ There must be some *objective*(s) to be *attained* at. If one wants nothing, one cannot have a problem.
- ✓ There must be alternative means (or the *courses of action*) for obtaining the objective(s) one wishes to attain. This means that there must be *at least two means* available to a researcher for if he has no choice of means, he cannot have a problem.
- ✓ There must be some *doubt* in the mind of a researcher with regard to the selection of alternatives. This means that research must answer the question concerning the relative efficiency of the possible alternatives.
- ✓ There must be some *environment*(s) to which the difficulty pertains
- ✓ Thus, a research problem is one which requires a researcher to find out the *best solution* for the given problem, i.e., to find out by which course of action will lead to attaining the objective optimally in the context of a given environment.
- ✓ There are several factors which may result in making the problem complicated. For instance, *the environment may change affecting the efficiencies of the courses of action or the values of the outcomes; the number of alternative courses of action may be very large; persons not involved in making the decision may be affected by it and react to it favorably or unfavorably, and similar other factors.*

SELECTING THE RESEARCH PROBLEM

The research problem undertaken for study must be *carefully selected*. The task is a difficult one, although it may not appear to be so.

Help may be taken from a research guide in this connection. Nevertheless, every researcher must find out his own *solution* for research problems.

A problem must spring from the researcher's mind

A research guide can at the most only help a researcher choose a subject. However, the following points may be observed by a researcher in selecting a research problem or a subject for research:

- ❖ Subject which is *overdone* should not be normally chosen, for it will be a difficult task to add to the body of knowledge.
- ❖ *Controversial* subject should not become the choice of an average researcher.
- ❖ Too *narrow* or too *vague* problems should be avoided.

SELECTING THE RESEARCH PROBLEM

The subject selected for research **should be familiar and feasible so that the related research material or sources of research are within one's reach**. Even then it is quite difficult to supply definitive ideas concerning how a researcher should obtain ideas for his research.

For this purpose, a researcher should contact an expert or a lecturer in the University who is already engaged in research. He / She may as well read articles published in current literature available on the subject and may think how the techniques and ideas discussed therein might be applied to the solution of other problems. He may discuss with others what he has in mind concerning a problem. In this way he should make all possible efforts in selecting a problem.

- **The importance of the subject, the qualifications and the training of a researcher, the costs involved, and the time factor** are few other criteria that must also be considered in selecting a problem. In other words, before the final selection of a problem is done, a researcher must ask himself the following questions:
  - ✓ Whether he is well equipped in terms of his background to carry out the research?
  - ✓ Whether the study falls within the budget he can afford?
  - ✓ Whether the necessary cooperation can be obtained from those who must participate in research as subjects?

If the answers to all these questions are in the affirmative, one may become sure so far as the practicability of the study is concerned

- The selection of a problem must be preceded by a preliminary study. This may not be necessary when the problem requires the conduct of a research closely similar to one that has already been done. But when the field of inquiry is relatively new and does not have available a set of well-developed techniques, a brief feasibility study must always be undertaken.

FORMULATING RESEARCH PROBLEMS

- Quite often we all hear that a problem clearly stated is a problem half solved.
- This statement signifies the need for defining a research problem. The problem to be investigated must be defined unambiguously for that will help to discriminate relevant data from the irrelevant ones.
- A proper definition of research problem will enable the researcher to be on the track whereas an ill-defined problem may create hurdles.
- Questions like: What data are to be collected? What characteristics of data are relevant and need to be studied? What relations are to be explored? What techniques are to be used for the purpose? And similar other questions crop up in the mind of the researcher who can well plan his strategy and find answers to all such questions only when the research problem has been well defined.

- Thus, defining a research problem properly is a prerequisite for any study and is a step of the highest importance.
- The most difficult aspect of research is formulating a
  - ✓ Clear,
  - ✓ Concise, &
  - ✓ Manageable research problem.
- Research problems are questions that indicate gaps in the scope or the certainty of our knowledge.
- They point either to problematic phenomena, observed events that are puzzling in terms of our currently accepted ideas, or to problematic theories, current ideas that are challenged by new hypotheses.

TECHNIQUES INVOLVED IN DEFINING A PROBLEM

- How to define a research problem is undoubtedly a phenomenal task. However, it is a task that must be tackled intelligently to avoid the perplexity encountered in a research operation. The usual approach is that the researcher should himself pose a question (or in case someone else wants the researcher to carry on research, the concerned individual, organization or an authority should pose the question to the researcher) and set-up techniques and procedures for throwing light on the question concerned for formulating or defining the research problem. *But such an approach generally does not produce definitive results because the question phrased in such a fashion is usually in broad general terms and as such may not be in a form suitable for testing*

- Defining a research problem properly and clearly is a crucial part of a research study and must in no case be accomplished hurriedly. However, in practice this is frequently overlooked which causes a lot of problems later on. Hence, the research problem should be defined in a systematic manner, giving due weightage to all relating points. The technique for the purpose involves the undertaking of the following steps generally one after the other:
  - *statement of the problem in a general way;*
  - *understanding the nature of the problem;*
  - *surveying the available literature*
  - *developing the ideas through discussions; and*
  - *Rephrasing the research problem into a working proposition.*

a) Statement of the Problem in A General Way

- First of all the problem should be stated in a broad general way, keeping in view either some practical concern or some scientific or intellectual interest. For this purpose, the researcher must immerse himself

thoroughly in the subject matter concerning which he wishes to pose a problem. In case of social research, it is considered advisable to do some field observation and as such the researcher may undertake some sort of preliminary survey or what is often called *pilot survey*.

- ❑ The problem stated in a broad general way may contain various ambiguities which must be resolved by cool thinking and rethinking over the problem. At the same time the feasibility of a particular solution has to be considered and the same should be kept in view while stating the problem.

b) Understanding the Nature Of The Problem;

The next step in defining the problem is to understand its origin and nature clearly. The best way of understanding the problem is to discuss it with those who first raised it in order to find out how the problem originally came about and with what objectives in view. If the researcher has stated the problem himself, he should consider once again all those points that induced him to make a general statement concerning the problem. For a better understanding of the nature of the problem involved, he can enter into discussion with those who have a good knowledge of the problem concerned or similar other problems. The researcher should also keep in view the environment within which the problem is to be studied and understood.

c) Surveying the Available Literature

All available literature concerning the problem at hand must necessarily be surveyed and examined before a definition of the research problem is given.

This means that the researcher must be well-conversant with relevant theories in the field, reports and records as also all other relevant literature. **He must devote sufficient time in reviewing of research** already undertaken on related problems. This is done to find out what data and other materials, if any, are available for operational purposes. "Knowing what data are available often serves to narrow the problem itself as well as the technique that might be used.".

This would also help a researcher to know if there are certain gaps in the theories, **or whether the existing theories applicable to the problem under study are inconsistent with each other, or whether the findings of the different studies do not follow a pattern consistent with the theoretical expectations** and so on. All this will enable a researcher to take new strides in the field for furtherance of knowledge i.e., he can move up starting from the existing premise.

Studies on related problems are useful for indicating the type of difficulties that may be encountered in the present study as also the possible analytical shortcomings. At times such studies may also suggest useful and even new lines of approach to the present problem.

d) Developing The Ideas Through Discussions

Discussion concerning a problem often produces useful information. Various new ideas can be developed through such an exercise. Hence, a researcher **must discuss his problem with his colleagues and others who have enough experience in the same area or in working on similar problems**. This is quite often known as an ***experience survey***. People with rich experience are in a position to enlighten the researcher on different aspects of his proposed study and their advice and comments are usually invaluable to the researcher. They help him sharpen his focus of attention on specific aspects within the field. Discussions with such persons should not only be confined to the formulation of the specific problem at hand, but should also be concerned with the general approach to the given problem, techniques that might be used, possible solutions, etc.

e) Rephrasing the research problem into a working proposition

Finally, the researcher must sit to rephrase the research problem into a working proposition. Once the nature of the problem has been clearly understood, the environment (within which the problem has got to be studied) has been defined, discussions over the problem have taken place and the available literature has been surveyed and examined, rephrasing the problem into analytical or operational terms is not a difficult task. Through rephrasing, the researcher puts the research problem in as specific terms as possible so that it may become operationally viable and may help in the development of working hypotheses.

DEFINING THE RESEARCH PROBLEM

- ✓ Technical terms and words or phrases, with special meanings used in the statement of the problem, should be clearly defined.
- ✓ Basic assumptions or postulates (if any) relating to the research problem should be clearly stated.
- ✓ A straight forward statement of the value of the investigation (i.e., the criteria for the selection of the problem) should be provided.
- ✓ The suitability of the time-period and the sources of data available must also be considered by the researcher in defining the problem.
- ✓ The scope of the investigation or the limits within which the problem is to be studied must be mentioned explicitly in defining a research problem.

An Example

"Why is productivity in Japan so much higher than in India"?

In this form the question has a number of ambiguities such as: What sort of productivity is being referred to? With what industries the same is related? With what period of time

the productivity is being talked about? In view of all such ambiguities the given statement or the question is much too general to be amenable to analysis. Rethinking and discussions about the problem may result in narrowing down the question to:

"What factors were responsible for the higher labour productivity of Japan's manufacturing industries during the decade 1971 to 1980 relative to India's manufacturing industries?"

This latter version of the problem is definitely an improvement over its earlier version for the various ambiguities have been removed to the extent possible.

Further rethinking and rephrasing might place the problem on a still better operational basis as shown below:

"To what extent did labor productivity in 1971 to 1980 in Japan exceed that of India in respect of 15 selected manufacturing industries? What factors were responsible for the productivity differentials between the two countries by industries?"

With this sort of formulation, the various terms involved such as 'labor productivity', 'productivity differentials', etc. must be explained clearly. The researcher must also see that the necessary data are available. In case the data for one or more industries selected are not available for the concerning time-period, then the said industry or industries will have to be substituted by other industry or industries.

The suitability of the time-period must also be examined. Thus, all relevant factors must be considered by a researcher before finally defining a research problem.

WHEN AND HOW TO FORMULATE PROBLEMS

- There has been considerable debate over whether or not it is important to define problems explicitly in advance of research and to show how they are linked to prior work.
- Many natural and social scientists **hold that research problems should be formulated by carefully analyzing as much of the relevant research literature as possible, formally stating the problem and the major hypotheses that the literature suggests, and only then collecting the data.** Their intention is to give research a clear and firm justification and to encourage hypothesis testing. This will ensure that each new study does its utmost to add in an orderly fashion to the sum of knowledge.
- However, there are many other natural and social scientists who are equally convinced that this style of formulating problems (above) tends to stifle questions and prevent discoveries that a more open-ended approach might stimulate. This group argues instead for **letting problems and hypotheses emerge throughout the research process, pushed forth by new empirical observations that encourage the researcher to ask new questions and build new theories**.

- Stating the problem early and in a highly structured form may indeed lock the researcher into a fixed stance with respect to the situation being observed, and it may also block the emergence of new ideas that might be stimulated by new experience. But open-endedness may have costs as well.

HOW DO RESEARCHERS COME UP WITH THE IDEA FOR A RESEARCH PROJECT?

- ***Experience of practical problems in the field***

One of the most common sources of research ideas is the experience of practical problems in the field. Many researchers are directly engaged in social, health or human service program implementation and come up with their ideas based on what they see happening around them. Others are not directly involved in service contexts, but work with people directly involved in these programmes in order to learn what needs to be done or investigated (on-going research programmes).

***Example*:** "Garbage management in Nairobi City" – This programme involves collection and transportation of municipal solid waste from Nairobi city to Korogocho where it is a land-filled. The primary goal of such a programme is to keep Nairobi City clean; but as we strive to achieve this, another problem crops up in which noxious gases and liquid effluent emanating from decomposition of organic waste at Korogocho pose other environmental problem to nearby communities and the ozone layer. Through such experiences, a research problem is identified and ways of solving it sought.

- ***Review of literature in your specific field***

Another source for research ideas is the literature in your specific field. Many researchers get ideas for research by reviewing the literature and thinking of ways to extend or refine previous research. Many published articles give an account of the problems that have been researched and the remaining gaps which need to be closed (need further research). In many cases, no single study will provide definite/permanent solutions to a research problem. Research is a continuous process and as one idea or theory is developed, it raises another question often through verification means.

- ***Requests For Proposals (RFPs)***

Another type of literature that acts as a source of good research ideas is the Requests For Proposals (RFPs) which are often published by government agencies and some companies. These RFPs describe "some problem" that the agency would like researchers to address. They are in principle giving the researcher an idea to work on. Typically, the RFP describes the problem that needs addressing, the contexts in which it operates, the approach they would like you to take to investigate/address the problem, and the amount they would be willing to pay for such research. This type of approach is commonly appealing in cases where partnerships are developed or exist between public or private research institutions (e.g universities) and private companies.

- ***Own ideas and peer discussions***

Many researchers think up their research topic on their own or through peer discussions. Definitely such thoughts/ideas developed into researchable problems are influenced by researcher's background, culture, education and experiences. Often these concepts are developed through workshops, seminars or presentation.

- ***Concept mapping***

Concept mapping is a general method that can be used to help any individual or group to describe their ideas about some topic in a pictorial form. It is primarily a group process and so it is especially well-suited for situations where teams or groups of stakeholders have to work together. Besides, it uses a very structured facilitated approach.

FACTORS THAT NEED CONSIDERATION WHEN FORMULATING A RESEARCHABLE PROBLEM

- ***Is the study feasible?***

Very soon after you get an idea for a study reality begins to kick in and you begin to think about whether the study is feasible at all.

There are several major considerations that come into play. Many of these involve making **tradeoffs between rigor and practicality**.

To do a study well from a scientific point of view may force you to do things you wouldn't do normally. You may have to control the implementation of your program more carefully than you otherwise might. Or, you may have to ask program participants lots of questions that you usually wouldn't if you weren't doing research. *If you had unlimited resources and unbridled control over the circumstances, you would always be able to do the best quality research. But those ideal circumstances seldom exist, and researchers are almost always forced to look for the best tradeoffs they can find in order to get the rigor they desire.*

- ***The Literature Review***

One of the most important early steps in a research project is the conducting of the literature review.

This is also one of the most humbling experiences you're likely to have. Why? Because you're likely to find out that just about any worthwhile idea you will have has been thought of before, at least to some degree.

A literature review is designed to identify related research, to set the current research project within a conceptual and theoretical context. If looked at that way, you will find that there is almost no topic that is so new or unique that you can't locate relevant and informative related research.

Some tips about conducting the literature review.

- First, *concentrate your efforts on the* scientific *literature*. Try to determine what the most credible research journals are in your topical area and start with those. Put the greatest emphasis on research journals

that use a blind review system. In a blind review, authors submit potential articles to a journal editor who solicits several reviewers who agree to give a critical review of the paper.

The paper is sent to these reviewers with no identification of the author so that there will be no personal bias (either for or against the author). Based on the reviewers' recommendations, the editor can accept the article, reject it, or recommend that the author revise and resubmit it. Articles in journals with blind review processes can be expected to have a fairly high level of credibility.

- Second, *do the review early* in the research process. You are likely to learn a lot in the literature review that will help you in making the tradeoffs you'll need to face. After all, previous researchers also had to face tradeoff decisions.

WHAT SHOULD YOU LOOK FOR IN THE LITERATURE REVIEW?

- ✓ First, you might be able to find a study that is quite similar to the one you are thinking of doing. Since all credible research studies have to review the literature themselves, you can check their literature review to get a quick-start on your own.
- ✓ Second, prior research will help ensure that you include all of the major relevant constructs in your study. You may find that other similar studies routinely look at an outcome that you might not have included. If you did your study without that construct, it would not be judged credible if it ignored a major construct.
- ✓ Third, the literature review will help you to find and select appropriate measurement instruments. You will readily see what measurement instruments researchers use themselves in contexts similar to yours.
- ✓ Finally, the literature review will help you to anticipate common problems in your research context. You can use the prior experiences of others to avoid common traps and pitfalls.

RESEARCH PROPOSAL STRUCTURE

PROPOSAL SECTIONS

1. TITLE PAGE

Should have the University Logo, Correct Title, student details, and the degree programme the student is taking

2. DECLARATION PAGE

The page contains the student's declaration of the originality of the Project Report.

This declaration page **must be signed** by the student.

3. DEDICATION PAGE (OPTIONAL)

Students may include an optional dedication for the Project Report. The dedication must be brief, not more than one paragraph and must not contain any number, chart or photograph.

4. ACKNOWLEDGEMENT PAGE (OPTIONAL)

Here you have the opportunity to thank the various people who have helped in the development of the project. It might include specific individuals who have given information, offered insights, or generally been supportive. Gratitude may be expressed to groups of people, like those who were studied, or fellow students.

5. TABLE OF CONTENT

Table of content identifies the contents and organization of document. It is made up of

- section headings
- page numbers

The table of content **SHOULD BE GENERATED AUTOMATICALLY** using the respective word processor

6. LIST OF TABLES

Section consists of list of the table used in the report, indicating table no, its title and page no found.

7. LIST OF FIGURES / ILLUSTRATIONS

Section consists of list of the figures or Illustrations such as diagrams, photographs, drawings, graphs, charts, maps etc used in the report indicating figure no, its title and page no found.

MAIN DOCUMENT

CHAPTER ONE: INTRODUCTION

Chapter one should be between a Minimum of 2 pages and Maximum of 3 pages and consist of the following sections

1.1 Introduction: Introduction of the project area; How it operates and how the problem exists

1.2 Background of the Study – is a minimum of ½ page and maximum of 1 page

This is usually detailed background information about the project/ research area and about the client. It should be clear on what business the client is involved in and how operations are currently conducted.

1.3 Problem Statement

This is a statement of the problem the project is intended to address. It should clearly show the problem in the light of the project research and its contribution to the solution. Ideally it should originate from the way the organization currently performs its functions. Each problem should be stated clearly with a brief explanation on how it arises from the functions be undertaken.

1.4 Objectives

Give the specific objectives of the proposed system i.e. what you want your system to achieve e.g. In a security based system to improve CIA then the system must have access controls in place. Accuracy, Audit trails, reporting etc

Clear, concise "**SMART**" objectives should be provided including project/ research and system development related objectives.

(S - Specific, M - Measurable, A - Achievable, R- Realistic/Relevant, T- Time bound/boxed.

The supervisor should guide the student on the minimum and maximum number of objectives as per his/her project. Key words like Investigate, develop and analyze should be used to list objectives

The researcher should also consider moral or ethical aspects if touching on people's health or any other private information

1.5 Scope and Limitation of the Study – a brief description of the project scope – what was covered and what was not and why?

1.6 Justification; - student should justify their project by indicating the interestingness and challenge that the project presents, the timeliness of the idea, the possible advantages that realization of such a project would bring.

1.7 Budget and Resources;-This should generally address all the envisaged resources that will enable the development of the system to succeed. The key items are hardware, software, human and any other costs that will be incurred.

1.8 Project Schedule: - a brief description of the project work breakdown structure. Project Gantt and Network diagram clear showing the Critical path should be included in the appendix section.

CHAPTER TWO: LITERATURE REVIEW

It should have a minimum 3 pages and maximum 5 pages

The literature review should **not** be just a compilation or reproduction of the works of others.

It requires the student to examine and cite critically on the literature relevant to the student's project area or area of research. It takes the following format:-

2.1 Introduction

Give an overview of what this chapter entails

2.3 Overview of literature review

Explain what Literature review is and its significance to the study.

- Find out the challenges faced previously on this study and the recommendations they made
- The main objective of Literature review is to explain how the proposed system is going to solve the problems of the reviewed systems.
- Assist the researcher with knowledge on how to realize the objectives of the research
- Formulate the research problem which is realistic and achievable i.e. make it more specific and less general
- Helps in coming up with SMART objectives for the research

2.3 Identify two or three similar systems that have been developed to address similar problems

2.3.1 Tools and Methodologies used in Reviewed Systems

For the systems you have identified discuss the tools used, methodology and the.

2.3.2 Advantages and Disadvantages of the reviewed systems

2.4 Bridge the Gap between the Reviewed systems and Proposed System.

Bridge the Gap between the Reviewed systems and Proposed System to avoid re-inventing the wheel i.e. duplication of what other researchers have done.

CHAPTER THREE: METHODOLOGY

This is a minimum of 4 pages.

The methodology chapter should describe a model/framework under which the system was developed. It should address at least the following areas:-

- The exact techniques used to collect facts and data
- Tools used to analyze the data and the processes
- Tools to implement and test the system
- Time schedule and project cost

It takes the following format:-

3.1 Introduction

Highlight all the topics to be covered in chapter three in only one paragraph

3.2. Define system analysis

3.2.1 State the objectives of system analysis

3.3 Methodology

Describe the type of methodology to used E.g. Evolutionally, waterfall, SSADM.

- State the reasons for choosing the methodology.
- Describe the tools that will be used in the methodology
- Steps to be followed in a diagram

3.4 Feasibility Study

Give the different types of feasibility study that will be carried out e.g. technical, economical operational and schedule feasibility.

Give a feasibility report to show that the project is feasible according to the feasibilities carried above.

3.5 Design Tools

Discuss the design tools that will be used in the proposed system. E.g. *flowcharts*, *DFDs*, *ERDs*, *ELH*, *Context Diagrams*, Pseudo codes (Algorithms), *data dictionary*. These tools should be the ones within the methodology.

3.6 Data collection Methods

These are the methods used to collect data during the feasibility study. Data can be collected using any of these ways:-

(i) ***By observation:*** This method implies the collection of information by way of investigator's own observation, without interviewing the respondents. The information obtained relates to what is currently happening and is not complicated by either the past behaviour or future intentions or attitudes of respondents. This method is no doubt an expensive method and the information provided by this method is also very limited. As such this method is not suitable in inquiries where large samples are concerned.

(ii) ***Through personal interview:*** The investigator follows a rigid procedure and seeks answers to a set of pre-conceived questions through personal interviews. This method of collecting data is usually carried out in a structured way where output depends upon the ability of the interviewer to a large extent.

(iii) ***Through telephone interviews:*** This method of collecting information involves contacting the respondents on telephone itself. This is not a very widely used method but it plays an important role in industrial surveys in developed regions, particularly, when the survey has to be accomplished in a very limited time.

(iv) ***By mailing of questionnaires:*** The researcher and the respondents do come in contact with each other if this method of survey is adopted. Questionnaires are mailed to the respondents with a request to return after completing the same. It is the most extensively used method in various economic and business surveys. Before applying this method, usually a Pilot Study for testing the questionnaire is conducted

this reveals the weaknesses, if any, of the questionnaire. Questionnaire to be used must be prepared very carefully so that it may prove to be effective in collecting the relevant information.

3.7 Required Resources

3.7.1 Hardware Specifications

The servers to host the application

Memory requirements, Processor speed, Hard disk capacity

3.7.2 Software Specifications

Operating system to be used and other required applications e.g. database

REFERENCES

This is a minimum of 1 page. References are the detailed description of resources from which information or ideas were obtained in preparing the Project Report. The details of every references cited in the text, published or unpublished, must be listed alphabetically in this page.

NOTE: - Recommended referencing style should be used

GENERAL FORMAT OF WRITING THE PROPOSAL

1. PAPER (PRINTING)

- Size - A4 (21.0cm X 29.7cm)
- Quality – A least 80gm weight
- Colour - White

2. FONT SIZE AND TYPE

Candidates must use Times New Roman or Arial font. No other fonts are acceptable. Font Size:

- For text use 12-point font.
- For tables and figures, use 10-point.
- For title page 12-point font,
- For Table of Contents 12-point font.

Please type in bold for headings and subheadings. Headings should be typed in all upper case letters while sub-headings are to be typed in upper and lower case letters.

3. FONT STYLE

Only one font style (Times New Roman) may be used throughout the project paper, including the title page, approval page, acknowledgment, bibliography and appendices. Exceptions to this can only be made for tables/figures/illustrations imported from other sources. Italic variants of the same font style may be used for

labels, foreign words, book titles or occasional emphasis. The usage of bold variants of the same font style and underlining in the text of headings and titles is at the student's discretion.

4. HEADINGS

Chapter headings are to be centered and written in **bold**, **upper case letters**. The font size for chapter headings is 14 point. Other sub-headings are to be aligned to the left margin and should be 12 point in font-size. Sub-headings should be in **Sentence Case**. Underlining and boldface in the sub-headings is at the student' discretion.

5. LINE SPACING

The project paper should be typed on one side of the page. The text should be spaced (1.5) throughout,

6. TEXT JUSTIFICATION

Set the justification to 'justify" and the margins 1 inch all round i.e. (Left, Top, Right and Bottom)

7. PLAGIARISM

Making proper text citations and providing accurate referencing for quotations are crucial to help ensure that students do not intentionally, or otherwise, plagiarize the work of others. Plagiarism occurs when people copy the words, the ideas, and/or the work that rightfully belong to others and then present these words, ideas, and/or work as if this material were their own words, ideas, or works. Students are advised to pay serious attention to this matter, as it is a very serious offence to plagiarize the work of others.

The best way to avoid plagiarism is to make proper documentation of the sources to which referred to in the project paper. Students are strongly cautioned that if there is evidence that a part or parts of a project paper has/have been plagiarized, the departmental examination board reserves the right to fail the student concerned and to report the student to the Disciplinary Committee of the University.