

ADVANCE RESEARCH METHODS QUANTITATIVE & QUALITATIVE TECHNIQUES

Final SEMESTER ASSIGNMENT

(Time Allowed: 06 hours)

Marks:50

Q 1. Distinguish between basic and applied Research. (10 Marks)

Ans: Research is a “creative and systematic work undertaken to increase the stock of knowledge, culture and society, and use the use of that stock of knowledge to develop new application”. It involves the collection, organization and analysis of information to increase our understanding of a topic or issue. At a general level, research has three steps;

1. Pose a question,
2. Collect data to answer the question,
3. Present an answer to the question.

This should be familiar process. You engage in solving problems every day and you start with a question, collect some information, and then form an answer.

There are two main type of research 1. Applied Research, 2. Basic Research.

1. **Applied Research:** used to answer a specific question that direct applications to the world. Applied Research can be defined as research that encompasses real life application of the natural science. It is directed towards providing a solution to the specific practical problems and develop innovative technology.

In finer terms, it is the research that can be applied to real-life situations. It studies a set of circumstances, to relate the results to its corresponding circumstances.

Applied research includes research that focuses on certain conclusions experiencing a business problem. Moreover, research that is aligned towards ascertaining social, economic or political trends are also termed as applied research.

2. **Basic Research:** driven purely by curiosity and a desire to expand our knowledge. Basic Research or otherwise called as pure or fundamental research, is one that focuses on advancing scientific knowledge for the complete understanding of a topic or certain natural phenomenon, primarily in natural sciences. In a nutshell, when knowledge is acquired for the sake of knowledge it is called basic research.

Basic Research is completely theoretical, that focuses on basic principles and testing theories. It tends to understand the basic law.

Basic Research deals with generalization and formulation of theory about human behavior. It is aligned towards collecting information that has universal applicability. Therefore, basic research helps in adding new knowledge to the already existing knowledge.

Comparison Chart

BASIC FOR COMPARISON	BASIC RESEARCH	APPLIED RESEARCH
Meaning	Basic research refers to the study that is aimed at expanding the existing base of scientific knowledge.	Applied research is the research that is designed to solve specific problem or answer certain questions.
Nature	Theoretical	Practical
Utility	Universal	Limited
Concerned with	Developing scientific knowledge and predictions,	Development of technology and technique,
Goal	To add some knowledge to the exiting one.	To find out solution for the problems at hand.

Conclusion

The type of research may vary on the basis of the level at which research is carried out and its purpose. One can choose basic research over applied research when the purpose is to add certain scientific knowledge, whereas when it is important to identify a proper solution to the problem under study, applied research is preferable.

Q 2. What are the basic steps for conducting a research. Explain with a schematic diagram. (10 Marks)

Ans: The process of gathering information for the purpose of **initiating, modifying or terminating** a particular investment or group of investments.

There are 7 STEPS OF RESEARCH PROCESS

- Step One: Define research problem
- Step Two: Review of literature
- Step Three: Formulate hypotheses
- Step Four: Preparing the research design
- Step Five: Data collection
- Step Six: Data analysis
- Step Seven: Interpretation and report writing

1. Step One: Define Research Problem

There are two types of research problem, viz., those

- relate to states of nature,
- relationship between variables.

Essentially two steps are involved in define research problem, viz.,

- understanding the problem thoroughly and,
- rephrasing the same into meaningful terms from a point of view.

2. Step Two: Review of Literature

- Once the problem is defined, a brief summary of it should be written down. It is compulsory for a research worker writing a thesis for a Ph.D. degree to write a synopsis of topic and submit it to necessary committee or the research board for approval.

3. Step Three: Formulate Hypothesis

- Formulate hypothesis is tentative assumption made in order to draw out and test its logical or empirical consequences. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested. The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track.

4. Step Four: Preparing the Research Design

- The function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money.
- Research purpose may be grouped into four categories, viz., (1) Exploration, (2) Description, (3) Diagnosis, and (4) Experimentation.

5. Step Five: Data Collection

- Primary data can be collected through:
- By Observation
- Through personal interview
- Through telephone interview by mailing of questionnaires
- Through Schedules

6. Step Six: Data Analysis

The analysis of data requires several closely related operations such as establishment of categories.

This stage mainly includes :

1. Coding
2. Editing
3. Tabulation

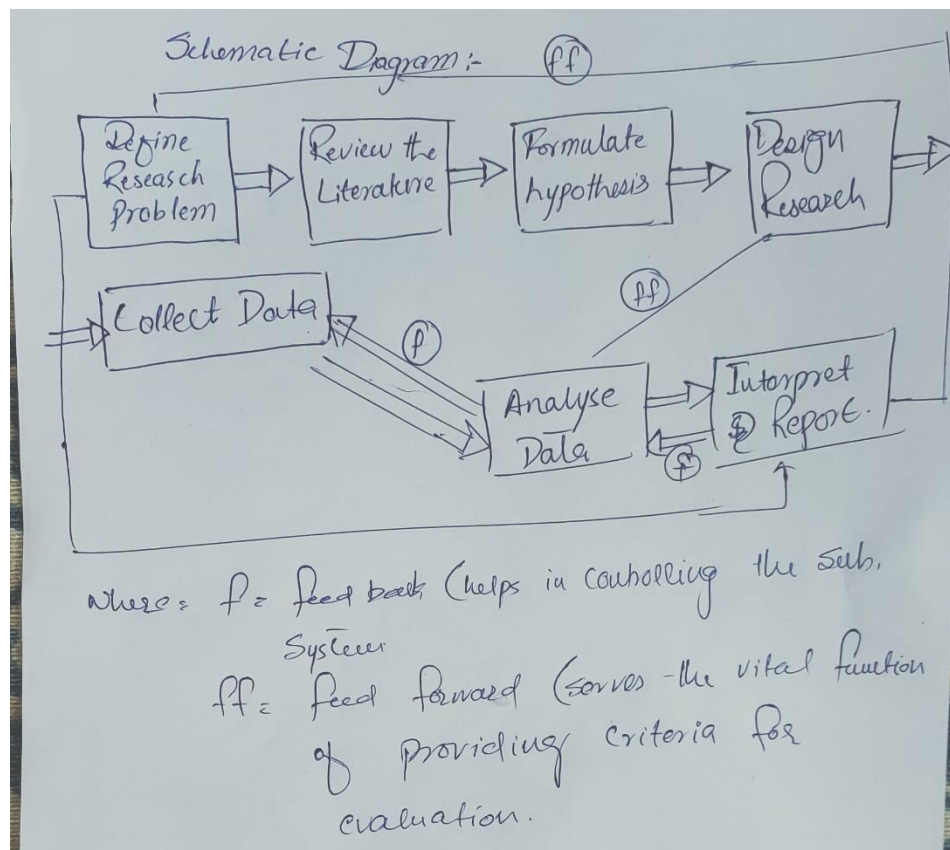
7. Step Seven: Interpretation and Report Writing

- Researcher must prepare the report of what has been done by him.

Writing of report includes:

1. the preliminary pages;
2. the main text, and
3. the end matter

Schematic Diagram



Q 3. Differentiate between any two types of research methodology. (10 Marks)

Ans: there are many research methodologies but two mainly are:

1. Qualitative Research
2. Quantitative Research

Qualitative Research

Qualitative Research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research. Qualitative Research is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus groups (group discussions), individual interviews, and participation/observations. The sample size is typically small, and respondents are selected to fulfil a given quota.

Quantitative Research

Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into usable statistics. It is used to quantify attitudes, opinions, behaviors, and other defined variables – and generalize results from a larger sample population. Quantitative Research uses measurable data to formulate facts and uncover patterns in research. Quantitative data collection methods are much more structured than Qualitative data collection methods. Quantitative data collection methods include various forms of surveys – online surveys, paper surveys, mobile surveys and kiosk surveys, face-to-face interviews, telephone interviews, longitudinal studies, website interceptors, online polls, and systematic observations.

Q 4. Give an introduction to Mixed Methods Research and identify situations in

which mixed methods research can be applied. (10 Marks)

Ans: **Mixed methods research** is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e. g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration.

When to use it ?

Mixed methods research is particularly suited:

- **When one wants to validate or corroborate the results obtained from other methods.**
- **When one needs to use one method to inform another method.** For instance, when little is known about a topic and it is necessary to first learn about what variables to study through qualitative research, and then study those variables with a large sample of individuals using quantitative research.
- **When one wants to continuously look at a research question from different angles and clarify unexpected findings and/or potential contradictions.**
- **When one wants to elaborate, clarify, or build on findings from other methods.** For instance, if a causal relationship has been established through experimental research but one wants to understand and explain the causal processes involved through qualitative research.
- **When one wants to develop a theory about a phenomenon of interest and then test it.** Usually, qualitative research is more suitable to build theory, while quantitative research provides a better way of testing theories.
- **When one wants to generalize findings from qualitative research.**

Q 5. Give a brief overview of your final research project.

(10 Marks)

Ans: that was my thesis which I submitted. Thank you

INTRODUCTION

1.1 Overview

Due to the advancement in telecommunications in past one decade our lives have been totally transformed. Wireless connection has quickly urbanized as an infamous novelty that gives connectivity around half the population on Earth. Because of quick raise of the web, it is the demand of time to have higher-speed-web internet broadband. DSL which gives broadband services has a speed of couple of megabits/sec. Alone in America, more than 50 million individuals utilize broadband which is lingering considerably by utilizing remote broadband modernization. To overcome the demand of high data speed broadband, the answer is WiMAX. The alternate technology that will replace DSL in the coming years is WiMAX [16]. There are two types of WiMAX communication i.e., conventional/fixed WiMAX that uses IEEE 802.16.2004 Mobile WiMAX that uses IEEE 802.16.2005e. In fixed WiMAX, there is no mobility but still uses radio resources to commune between BS and MS. As compared with fixed WiMAX, mobile WiMAX is more reliable and faster by providing more speed for browsing, streaming, tele-conferencing, multi-player online gaming, live TV channels and audios. This new technology provides high speed mobile station based on IP which is more secure and will be the main ingredient for the 4th and 5th Generation of mobile Internet. To provide smoother mobile WiMAX mobility, IEEE 802.16e-2005 provides three types of handoff mechanisms: Hard Handoff (HH), Micro Diversity Handoff (MDHO) and Fast Base Switching Station (FBSS). Hard Handoff is mandatory, however, to improve the performance, MDHO and FBSS can also be used. The edge of WiMAX technology over current technology in the market is that WiMAX has the lowest delay and disturbance during handoff. Comparison of different Handoff mechanisms will be the focus of this thesis to evaluate their effect on mobile WiMAX and to study the effect of messages exchanged by different MAC layers during different Handoff mechanisms. End-to-End WiMAX Engineering is not defined by IEEE 802.16e-2005 which was then stated by Network Working Group. Hence it is meaningful to examine the reaction of Handoff at IP layer.

1.2 Scope of the Thesis

In this thesis, different Handoff mechanisms will be compared to evaluate their effect on mobile WiMAX and to study the effect of messages exchanged by different MAC layers during different Handoff mechanisms. End-to-End WiMAX Engineering is not defined by IEEE 802.16e-2005 which was then stated by Network Working Group. Hence it is meaningful to examine the reaction of Handoff at IP layer. All the scenarios will be simulated using OPNET simulation tool.

1.3 Goals

With a specific end goal to get done the above say, the point of the venture the associated destinations must be met.

- ❖ The contributions of this research thesis are summarized as follows: In depth study of Mobile WiMAX for better understanding.
- ❖ Detail analysis of numerous Handoff systems including MAC layer of Mobile WiMAX.
- ❖ Simulation of various handover schemes based on various handover parameters like, serving BS, deferral, and jitter and so on.
- ❖ Performance comparison of the handover schemes will be performed to identify the best handover scheme.

1.4 Thesis Report Organization

The organization of this thesis is divided into 7 chapters. Chapter One is all about introduction of Mobile WiMAX, aims, objectives and then all the issues related to this project. The literature review of the Mobile WiMAX is explained in Chapter Two. All the Mobile WiMAX handovers are discussed in Chapter Three. Without design and simulation, a project means nothing so Chapter Four is about design methodology, how different handovers scenario works under different circumstances and loads. I use OPNET as my simulation tool which is discussed in Chapter Five with simulation results. Chapter Six is all about analysis and which we got from OPNET simulation. Last but not least, the results and conclusion are winded up in Chapter Seven with recommendations.

1.5 Mobility Management Specialized Concerns

End user gets benefits from WiMAX because of its fast data rate during mobility. The subscriber faces many hurdles by moving to random Base Stations in sequence for Handoff. There must be at least two Base Stations and the Mobile Station must choose the best available Base Station to minimize the delay. Balance is the Key between dropping probability & Handoff rate for Handoff Protocols.

Different Handoff system will be the focus of this thesis to evaluate & point out the main effect on mobile WiMAX and messages exchanged by different MAC level during Handoff. End-to-End WiMAX Engineering is not defined by IEEE 802.16e-2005 which was then stated by Network Working Group. Hence it is meaningful to examine the reaction of Handoff at IP layer. All the scenarios will be examined via OPNET simulation tool.

The other more important factor which must be addressed that during Handoff there must be enough radio signals so that the Handoff can be done without much delay and the session does not drop. The mobility is administrated by MAC layer and it has nothing to do with IP layer during the Handoff. The IP for the mobile terminal is fixed either it is in the FA (Foreign Agent) or HA (Host Agent), and this issue can sometime affect the applications which uses IP like multi-casting and Webcasting