Research Methodology (2-1-0)

Presented by:
Dr. Baniya Arjun
United Technical College

Date: 8th May 2023

Course Objectives:

- Introduces students to fundamentals of RM including the elements of research like the research process, theoretical framework and the research design

- The description of research : data and information for research and writing a research proposal

Course Contents:

1. Introduction
2. Elements of Research : The research process
3. Elements of Research: The Theoretical Framework
4. Elements of research: The Research Design
5. Description of research
6. Data and Information of research
7. Writing a Research Proposal

Text Books:

- Action, Q. Ashton (2011). Issues of Engineering Research and Application, Atlanta, Georgia: Scholarly Edition. (Chapter 4 available in web version, free of cost)
- Marder, Michael P. (2011). Research Methods for Science , Cambridge: Cambridge University Press.
- Pant, Prem R. (2012). Social science Research and Thesis Writing, Kathmandu: Buddha Academic Publishers and Distribution.

Library :

Dev Raj Adhikari and Dhruba Lal Pandey "Business Research Methods"

References

- Miller, Delbert C., 2007. Handbook of Research Design and Social Measurement, New York: Stage Publication
- Smith, Robert V. (1990). Graduate Research : A guide for studnets in the science, New York: Plenum Publishing.

Evaluation

- Attendance-10
- Assignment- 10 (Hand written)
- Presentation-5
- Unit test-5
- Final assessment-20
- Final Exam

Introduction

Presented by:
Dr. Baniya Arjun
Pokhara Engineering College

Date: 20th May 2022

Research

- Re-means again and search means find out
- In simple terms research means to search again
- Research (search of searched) means to elicit some facts out of a known thing (थाहा भएको कुराबाट केही तथ्यहरू बाहिर निकाल्नु हो)
- Research is scientific and systematic search for various information about a specific topic
- It is actually a journey to discover some facts
- defined as a process of searching knowledge

Research

- The Advanced Learner's Dictionary of Current English lays down the meaning of research as "a careful investigation or inquiry specially through search for new facts in any branch of knowledge." ("ज्ञानको कुनै पनि शाखामा नयाँ तथ्यहरूको खोजी गरेर विशेष गरी सावधानीपूर्वक अनुसन्धान वा सोधपुछ।")

Research

- Therefore, research can be defined as the set of activities which searches anything for some new facts that is already conducted in the past.
- In fact research is not only the exploring the previous facts but it is also the process of generating new theory that can solve the problem relating to the society and business transaction.

Research

- It is considered to be systematic and intensive process of a scientific analysis to search for knowledge.
- It is a problem solving and fact finding method that consists of problem identification, hypothesis formulation, observation, data collection, data analysis and finally interpreting the results.

Research

- Research is a systematic and organized effort to investigate a specific problem that needs a solution (Sekaran, 1992) (अनुसन्धान भनेको एक निश्चित समस्याको खोजी गर्न व्यवस्थित र संगठित प्रयास हो जसलाई समाधान चाहिन्छ)
- Redman and Mory "Systematic effort to gain new knowledge"
- D.K Bhattacharya "a documented and organized analysis of the subject based on borrowed materials with suitable acknowledgement and consultation is the main body of paper"

Research

- General agreement of research

1. Is a process of inquiry and investigation?

Corona –problem- research-vaccine (Solution)

2. Systematic and methodical

3. Increase knowledge

Management Research

- Management research is defined as systematic process that aids in the field of management
- It is a systematic inquiry that aids in the finding of solutions related to the management
- It is based on primary or secondary data

Scientific Research Process

Primary Data	Secondary Data
Those data which are collected a fresh and for the first time on the account of concerned	Are compiled data (संकलित) that are taken from several primary sources and synthesized (संश्लेषित) or summarized in some way
Also called original data	Secondary data are not original data
Collecting methods: observation method, interview, questionnaire etc.	Achieved from published sources and unpublished sources such as CBS, Research institution, Report of ADB, WB

Management Research

Why Managers and Engineers Should Know about Research?

- With good understanding of the research and good computer skills, a manager can face decision situations involving many sophisticated variables
- Through research, engineers can discover new knowledge, improve existing technologies, develop new solutions, stay up-to-date on the latest developments in their field, meet customer demands, and innovate.
- For these reasons, research is a critical component of the engineering

Research Objectives

- Different research activities are conducted in various purposes
- Gain familiarity with a new phenomenon or develop new insight in to a phenomenon (नयाँ घटनासँग परिचितता, घटनामा नयाँ अन्तरदृष्टि विकास)
- Review and synthesize the existing knowledge (अवस्थित ज्ञानको समीक्षा र संश्लेषण गर्नु)

Example: TV, Computer

- To portray accurately the characteristics of a particular individual, situation or group (एक विशेष व्यक्ति, स्थिति वा समूहको विशेषताहरू सही रूपमा चित्रण गर्न)

Research Objectives

- Generate new knowledge
- Explore and analysis more general issues
- Improving the understandings on misunderstood phenomenon.
- Application testing: validity and reliability (वैधता र विश्वसनीयता)
- Helping in decision making

Types of Research

A. On the basis of Objectivities

1. Descriptive

- Non Experimental research
- Describes the event or phenomenon-observing and then drawing conclusion form it.
- No manipulation of data
- Simply observation is done
- Always answer the questions- “what is “ or “what was”, how is, how was, where, who and so on.
- Includes –fact finding enquires , surveys

Types of Research

A. On the basis of Objectivities

2. Exploratory – Explore

3. Correlational- relation between two variables, not cause and effects

- Positive correlation: A positive relationship between two variables is when an increase in one variable leads to a rise in the other variable.
- A decrease in one variable will see a reduction in the other variable.

For example, the amount of money a person has might positively correlate with the number of cars the person owns.

Types of Research

2. Negative correlation:

- A negative correlation is quite literally the opposite of a positive relationship.
- If there is an increase in one variable, the second variable will show a decrease and vice versa.

For example, being educated might negatively correlate with the crime rate when an increase in one variable leads to a decrease in another and vice versa. If a country's education level is improved, it can lower crime rates.

Please note that this doesn't mean that lack of education leads to crimes. It only means that a lack of education and crime is believed to have a common reason – poverty.

Types of Research

3. No correlation:

- There is no correlation between the two variables in this third type.
- A change in one variable may not necessarily see a difference in the other variable.
- For example, being a millionaire and happiness are not correlated. An increase in money doesn't lead to happiness. (करोडपति हुनु र खुशी को सम्बन्ध छैन। धन वृद्धिले सुख प्राप्त गर्दैन।)

Types of Research

4. Experimental- Experiment

5. Explanatory- explain why things happen (cause and effect relationship) (व्याख्यात्मक अध्ययन)

- An explanatory study of college students' addictions to their electronic gadgets, for example, might aim to understand why students become addicted.

Types of Research

B. On the basis of outcome

1. Fundamental

- A research that is conducted to acquire depth knowledge on any issue or for the development of theory is known as basic or fundamental research.
- A research which is directing towards finding information that has a broad base of application and thus, adds to the already existing organized body of scientific knowledge is termed as fundamental research

Types of Research

- The primary purpose of basic research is to generate more knowledge and understanding of the phenomenon of interest and to create theories from research results. Results and theories of basic research can then be applied later to actual situations
- The result of fundamental research can be generalized universally
- Research concerning some natural phenomenon or relating to pure mathematics or concerning human behaviors are examples of fundamental research
- Also called Basic Research
- D.B. Bhattacharya " A research that is primarily interested to find out certain basic principles not the solution of the problem is basis research.

Types of Research

B. On the basis of outcome

1. Fundamental

- This research which provides base for searching new to the society is called basic research.
- It formulates theory and develops principle that may or may not have practical application at present
- It has no limited time frame
- It has no any kind of immediate utilization and commercial purpose.
- It is essential for nourishing the expansion of knowledge .
- It is conducted by authors, scientists and scholars of scientific community.

Types of Research

2. Applied Research

- A research which is carrying out to finding a solution for an immediate problem facing a society or an industrial, business, governmental organization is known as applied research
- The main purpose of applied research is to discover a solution for some pressing practical problems
- They cannot be generalized universally
- It is result oriented research having limited time frame.
- The major purposes of applied research is to solve the currently happened problem in society and business about policies, program, projects and procedures

Types of Research

2. Applied Research

- Example: Researcher is interested to find out the factors which makes the decrease of enrollment of students in the last year at BE level of United Technical College.
- Consumer's perception on safety of the Samsung mobile phones
- Factors affecting the sales of Penguin mineral water in Jomsom and Beni
- Managers, directors, and business executive, police and general people take interest in conducting applied research.

Benefits of applied research

2. Applied Research

- Beyond serving as a way to solve existing problems, applied research has several benefits. Here are some advantages of using applied research:
- Saving businesses money by helping them make better decisions
- Creating new objectives
- Designing new products and services
- Providing unbiased data through testing empirical evidence

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Engineering Research

- Electrical engineering is a well-sought field that deals with the design and manufacture of different electrical and electronic systems.
- Electrical engineering encompasses power and electronics.
- The basic principle of digital technology and electricity are all given birth to in this field.
- From your lighting to computers and phones, everything runs based on electricity.

Engineering Research

- Here are some electrical engineering topics to give you a great head start in your research!

- A study on how temperature affects photovoltaic energy conversion.
- The impact of solar charging stations on the power system.
- Direct current power transmission and multiphase power transmission
- Analysis of the power quality of the micro grid-connected power grid.
- Solar power and inverters
- Alternator and electric magnetic induction
- AC to DC converters
- Operational amplifiers and their circuits.
- Wireless transmission of electric current

Bases of Differences	Basic Research	Applied Research
Objective	Main Objective of basic research is to develop theory and enhance the existing knowledge	Main aim of applied research is to find out the solution of immediate problems faced by the concerned organizarion
Focus	Researcher undertakes research in those issues where he/she has interest and knowledge	Researcher should conduct research focusing on the problems faced by the society or organizations
Time limit	There is no time limit in basic research	Fixed time is given to the researcher in applied research
Generalization	Results of basic research can be generalized in all the similar nature of organization	Applied research focuses on the particular problem of particular organization. So generalization is not possible and necessary
Practical	Principles developed through basic research cannot be implemented immediately in practice	Findings of the applied research can be implemented immediately in real life or practice
example	Research concerning some natural phenomenon or relating the pure mathematics or concerning human behaviour are examples of fundamental research	An Investigator or researcher is interested to find the factors, which makes the decrease of enrollment of students in the last few year at BE level of United Technical College

Research Methods vs. Research Methodology

Problem: Department XYZ (Faculty Shortage)

Solution : University or College will Invite Job Applications

How will objective be achieved ?

By :

1. Walk – In Interview
2. Written Test & Interview
3. Direct Interview

Research Methods vs. Research Methodology

EXAMPLE

University or College

Problem: Department XYZ (Faculty Shortage)

Solution : University or College will Invite Job Applications

How will objective be achieved ?

1. Advertisement of Vacancy Post
2. Submission of applications
3. Screening of eligible candidates
4. Call for interview
5. Panel Selections
6. Conduct interviews
7. Selection Process
8. Recruitment

METHODOLOGY

Research Methods vs. Research Methodology

METHODS

- It refers to the methods/technique use in performing research operations

METHODOLOGY

- It refers to the steps that are generally adopted by a researcher in solving the research problem systematically

Research Methods vs. Research Methodology

METHODS

- Different kind of methods is available. But not all methods, prove desirable results. Therefore, selecting the most appropriate method (out of the many) is vital.

METHODOLOGY

- The procedures by which researchers conduct the selected method and thus describe, explain and predict the phenomena or problem of interest

Research Methods vs. Research Methodology

METHODS

- Research methods help us collect data and find a solution to a problem

METHODOLOGY

- Research methodology is the study of methods by which knowledge is gained

Research Methods vs. Research Methodology

METHODS

- Research methods are the techniques and tools used for researching a subject or a topic

METHODOLOGY

- Research Methodology explains and justifies the techniques and tools by which research is carried out

Research Methods vs. Research Methodology

METHODS

- Research methods are the methods used by researchers to collect data to conduct research on a particular research topic

METHODOLOGY

- A Research methodology is systematic approach to solve the research problem

Research Methods vs. Research Methodology

1. Research Methods:

- Research methods refers to all those methods, techniques and procedure, that are applied during the course of studying research problem to answer research problem are known as the research method
- In other words, research method explains how a researcher identifies, collects, processes and analyze data
- Examples of Research Methods are:
- Experiments, Surveys, Questionnaires, Regression, Correlation, Interviews, Case studies, observations etc

Research Methods vs. Research Methodology

2. Research Methodology:

- It is a systematic approach to solve the research problem and to reach a new conclusion.
- Research methods- its objective is to find the solution
  - It is used during latter part of research process.
- Research methodology: its objective is to determine the solution by applying correct procedures of research.
  - Used in the initial stage.

Research Methods vs. Research Methodology

BASIS OF COMPARISON	RESEARCH METHOD	RESEARCH METHODOLOGY
Meaning	Research Method implies the methods employed by the researcher to conduct research.	Research methodology signifies way to efficiently solving research problems.
What is it?	Behavior and instrument used in the selection and construction of the research technique.	Science of understanding, how research is performed methodically.
Encompasses	Carrying out experiment, test, surveys and so on.	Study different techniques which can be utilized in the performance of experiment, test, surveys etc.
Comprise of	Different investigation techniques.	Entire strategy towards achievement of objective.
Objective	To discover solution to research problem.	To apply correct procedures so as to determine solutions.

Scientific Research

- Science is defined as the systematic organization of knowledge
- Science has 2 purposes

i. Improve the quality of life

ii. Development of explanatory relationships, called theories (व्याख्यात्मक सम्बन्धको विकास)

Scientific Research

- **Scientific Research** focuses on solving problems by following a logical, organized, and rigorous method to identify the problems, gather data, analyze that data, and draw valid conclusions from it. (वैज्ञानिक अनुसन्धानले समस्याहरूको पहिचान गर्न, तथ्याङ्क सङ्कलन गर्न, त्यस डाटाको विश्लेषण गर्न र त्यसबाट वैध निष्कर्ष निकाल्न तार्किक, संगठित र कठोर विधि अपनाएर समस्याहरू समाधान गर्नमा केन्द्रित हुन्छ।)
- **Decisions based on scientific research are purposive, rigorous and effective** (वैज्ञानिक अनुसन्धानमा आधारित निर्णयहरू उद्देश्यपूर्ण, purposive र प्रभावकारी हुन्छन्)

Scientific Research

- Scientific Research applies to both basic and applied research
- Scientific research is not based on hunches, experience, and intuition alone but purposive and rigorous (Shekran, 1992)
- वैज्ञानिक अनुसन्धान केवल अनुमान, अनुभव र अन्तर्ज्ञानमा आधारित छैन तर उद्देश्यपूर्ण

Characteristics Scientific Research

1. Purposiveness: Scientific Research has a specific goal and well-defined purpose

2. Objectivity

- Research with out bias

3. Reliability

- It means consistency (getting same and similar results), can be termed as verifiability

Characteristics Scientific Research

4. Validity

- Stands for accuracy of procedures, research instruments, tests etc.

5. Accuracy

- Degree to which research process, instruments and tools are related to each other

Characteristics Research

6. Generaliability

- Degree to which research findings can be applied to a larger population

7. Replicable

- नक्कल गर्न मिल्ने
- Results of research can be verified

8. Research is systematic process

9. Research requires patience and courage -धैर्य र साहस

10. Research is based upon observation and experiments

11. Research is directed towards solution of problem

Characteristics of Good Researcher

SEARCH

S- Scientific वैज्ञानिक

E-Efficient, Effective, Economical कुशल, प्रभावकारी, आर्थिक

A-Active

R- Research oriented, Resourceful अनुसन्धान उन्मुख

C- Creative रचनात्मक

H- Honest इमानदार

Characteristics of Good Researcher

1. Intellectual Curiosity

- A good researcher undertakes a deep thinking and inquiry of the things and the situations around him

2. Prudence-विवेक

- The researcher is careful to conduct his research study at the right time and at the right place wisely, efficiently and economically (अनुसन्धानकर्ताले आफ्नो अनुसन्धान अध्ययनलाई सही समयमा र सही ठाउँमा बुद्धिमानी, प्रभावकारी र आर्थिक रूपमा सञ्चालन गर्न सावधान)

Characteristics of Good Researcher

3. Healthy Criticism

- The researcher is always doubtful as to the truthfulness of the results-नतिजाको सत्यतामा अनुसन्धानकर्ता सधैं शंकालु

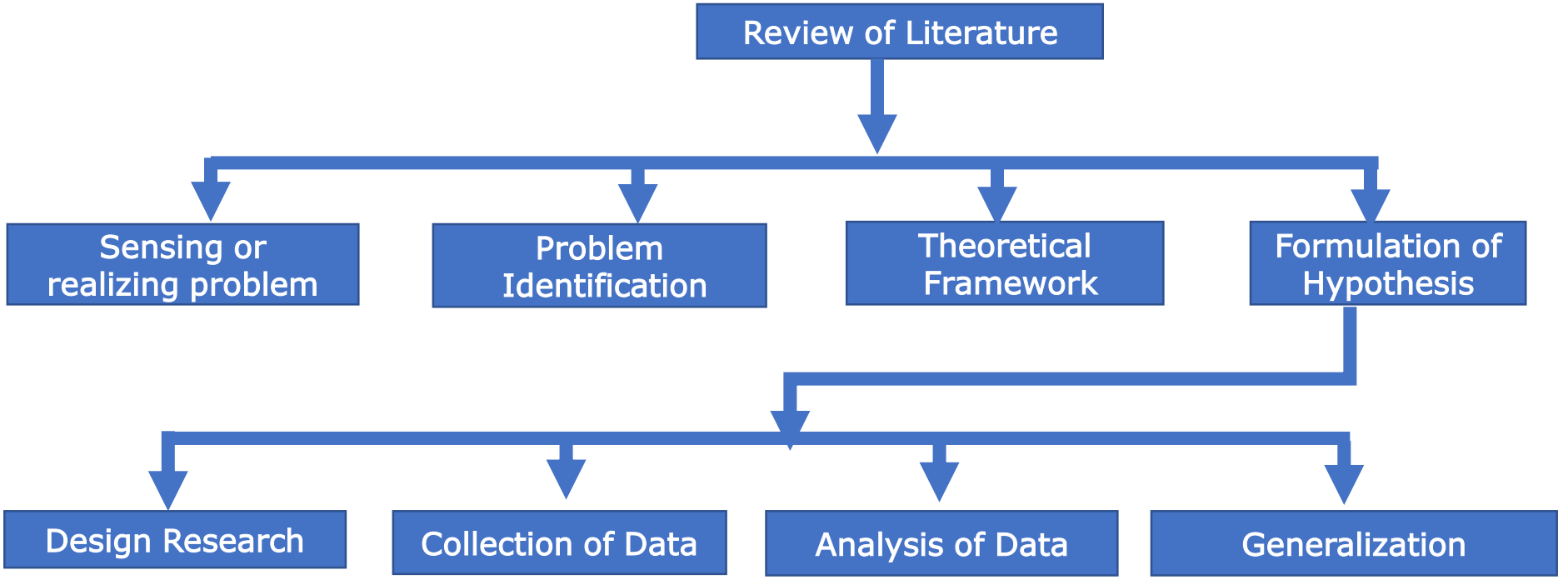
4. Intellectual Honesty

- An intelligent researcher is honest to collect or gather data or facts in order to arrive at honest results

5. Intellectual Creativity

- A productive and resourceful investigator always create new researches

Scientific Research Process



Scientific Research Process

1. Sensing or Realizing Problem

- The first step in any scientific inquiry is observing the situation and sensing the problem
- New problems keep on emerging on the environment

We somehow sense these developments occurring in the environment

- At this stage, we may not know exactly what is happening but we can definitely sense that things are not going on a smoothly as they should be

Scientific Research Process

- Researcher should realize and be worried with such problem
- Realization can be made through feeling, study, experience and observation
- If researcher is not able to find out the problem then he/she can feel the difficulty in the environment

Scientific Research Process

2. Problem Identification

- On observing carefully over something in the environment we would find many problems that are affect the environment
- Researcher try to identify what exactly are the problems in the situation
- The factors associated with the problem are also identify
- At the beginning of the process the researcher must single out the problem he/she wants to study

Scientific Research Process

- Researcher should find out the problem and its causes through the collection of information and analysis of situation

➢ For example, if the sales of an organization is decreased then decrease in the sale is symptom so the researcher should find out the causes of decrease in the sales. It may be due to lack of motivation, incompetent sales force etc.

➢ How to enhance the competence is the research problem

Scientific Research Process

3. Review of literature

- Literature review refers to the study of previous research and documents
- Researcher should find out the study gap from the review of literature
- It simultaneously helps to develop theoretical framework

Scientific Research Process

Theoretical Framework

- Third step of scientific research
- We make to an attempt to integrate the information logically so that the reason for the problem can be conceptualized
- The critical variables are examined and the association among them is identified
- Putting all the variables and their association together, a theoretical framework is developed

Scientific Research Process

4. Hypothesis Formulation

- In the fourth step of scientific research, hypothesis are formulated
- A hypothesis is not simply a guess ! It's a statement of what we believe will happen based on the information we have collected
- From our hypothesis, we would able to predict the results. It helps to solve our problem
- Our hypothesis has to help us get closer to the right result

Scientific Research Process

- Hypothesis are logically conjectured (अनुमान गरिएको) relationship between 2 or more variables expressed in the form of testable statements
- Hypothesis for the are drawn from the theoretical framework as developed in step III

Scientific Research Process

4. Hypothesis Formulation

Example: An investigator is interesting to study about the relationship between the performance of graduate products of Pokhara University (CM) and Tribhuvan University (CM)

1. Null Hypothesis (H_O): There is no significant difference in the performance of CM products of two university

2. Alternative Hypothesis (H_1): The performance of CM products of PU is higher than that of TU

Scientific Research Process

- H_O is defined as statistical hypothesis and is the default or original. H_O is a hypothesis which the researcher tries to disprove , reject or nullify.

- Null often refers to the common view of something while the H_1 is what the researcher really thinks is the cause of phenomenon

- Hypothesis may not be always accepted. Sometime, it may be rejected. Hypothesis helps to systematize the results and draw conclusions

Scientific Research Process

5. Research Design

- Research design is a framework of research
- Research design is the conceptual structure within which the research would be conducted
- Main purpose of selecting a research design is to provide the collection of relevant evidence with in less time, cost and effort
- Selection of research design depends upon the research purpose (research objectives)
- Research design is prepared before initiating research

Scientific Research Process

6. Collection of Data

- Collection of information on the basis of research problem and objectives is referred as data collection
- It is the work performed in the field/outside the organization
- Success of research depends largely on data collection
- Reliable (भरपर्दो) data collection helps to draw reliable conclusions
- In dealing with any problem it is necessary to collect adequate and appropriate data

Scientific Research Process

- At this stage, the researcher has to administer the research instruments (questionnaire, interview schedules, observations schedules etc) to gather data as expected in step I
- Depending upon the nature of the problems either primary or secondary data are collected
- Generally for most research primary data are appropriate

Scientific Research Process

7. Data Analysis

- After the data have been collected, the researcher analyzes the those data
- A researcher should classifies all the collected data and information on the basis of their feature and nature
- Classified data are then codified, tabulated and presented in the chart and tables
- Such presented data are analyzed using mathematical, statistical, financial and accounting tools

Scientific Research Process

- By using various statistical measures the data are analyzed
- After analyzing the data, the researcher's next job is to test the hypothesis which he had formulated earlier
- Hypothesis may be tested through different statistical tests such as t-test, ANOVA test, Shapiro-Wilk test, Kruskal-Wallis test etc

Scientific Research Process

8. Generalization

- Final step of scientific research process
- Research should give answer to research questions
- Researcher develop report incorporating all the procedures and findings so as to inform to the outsiders.
- Such conclusions of research are applied in all the similar organization which is regarded as generalization

Scientific Research Process

- If a hypothesis is tested, it may be possible for the researcher lies in its ability to arrive at certain generalizations
- If his research had no hypothesis to start with, he/she would be explained his finding, on the basis of some theory (also known as interpretation)

Thank You.

for listening……