Meaning of research

"A careful investigation or inquiry specially through search for new facts in any branch of knowledge"– The Advanced Learners Dictionary.

Objectives of research

- Uncover the truth which has not been discovered as yet.
- To get familiarity with a phenomenon
- To explore new facts
- To identify cause- effect relationship

Research Approaches

1. Quantitative
    - inferential
    - experimental
    - simulation
2. Qualitative
    - subjective assessments

Research & scientific methods

Types of propositions

1. Dogmas
2. Hypothesis
3. Universal Truth

Steps in research process

"Research methodology is a way to systematically solve the research problem"

Step-I: Formulating the research problem

Two types

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- relate to state of nature
- relate to relationship between wariables
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Step-II Literature survey/ productive discussions

Step-III Development of a hypothesis

" Commonsense is the chief requisite and logic is the chief teacher"

Hypothesis- what people says!

"A fact is a simple statement that everyone believes. It is innocent, unless found guilty. A hypothesis is a novel suggestion that no one wants to believe. It is guilty, until found effective."—-Edward Teller(Hungarian-American physicist)

Hypothesis- what theory says!

- Hypothesis originates from the Greek work hupo (under) and thesis (placing). It means an idea made from limited evidence. It is a starting point for further investigation.
- Hypothesis may be defined as a proposition or a set of proposition set forth as an explanation for the occurrence of some specified group of phenomena either asserted merely as a provisional conjecture to guide some investigation or accepted as highly probable in the light of established facts.

Characteristics of hypothesis in Research Methodology

- Hypothesis should be clear and precise.
- Hypothesis should be capable of being tested.
- Hypothesis should state relationship between variables, if it happens to be a relational hypothesis.
- Hypothesis should be limited in scope and must be specific.
- Hypothesis should be stated as far as possible in most simple terms so that the same is easily understandable by all concerned.
- Hypothesis should be consistent with most known facts.
- Hypothesis should be amenable to testing within a reasonable time.
- Hypothesis must explain the facts that gave rise to the need for explanation.

Hypothesis- what we have to know!

- A hypothesis is a conjecture on its trial.
- Its existence is threatened by every relevant fact which it cannot explain and it is finally destroyed by one single "crucial instance" that refuses to illustrate it.
- Moreover it is liable at every moment to be supplanted by some simpler more fundamental or far-reaching hypothesis.
- An Einstein comes after our Newtons and at least startles the world.
- The whole progress of science when it takes long strides illustrates this revolutionary kind of advance that comes from the substitution of one hypothesis for another.

##Step-IV: Preparing a research design

Research design is a conceptual structure/ frame work within which research would be conducted. It will be based on the research purpose. A meaningful classification is

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- Exploration
- Description
- Diagonosis
- Experimentation
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Step V: Determining sample design

Types of sample design

1. Probabilistic sampling
    - simple random sampling
    - systematic sampling
    - strtified sampling
    - cluster sampling

2. Non-probabilistic sampling
    - convenience sampling
    - judgement sampling
    - quota sampling

Step-VI: Collecting the data

Through experiments or survey

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Stage I- Planning
Stage II- Execution
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Principles of Questionire Design

1. Sensitive to the study.
    - Confidentiality should be guaranteed.
    - Sidetracking should be avoided at all costs.
    - completion time stamp should be used.
    - Should clarify the usefulness of the study
    - motivate the respontents to participate.
    - demographic information should be collected
2. Keep it Simple.
    - Should have a logical order
    - Neet layout
    - Well designed

Questionire Design Cont...

3. Question designing
    - Ask one information at a time
    - Ask questions having specific answer
    - Ask appropriate, non-judgemental questions
    - Avoid suggestive questions
    - Use short questions
    - Avoid jargon, abbreviations or slang
    - Use mutually exclusive and exhaustive answer options

Questionire Design Cont...

4. Types of questions
    - Closed-ended questions
        - Yes/no questions
        - Multiple choice
        - Scaled questions
    - Open-ended questions
        - Completely unstructured
        - Word association
        - Sentence completion
        - Story completion
5. Choose the Best Delivery (data collection) Method.

- Postal
- Telephone
- Electronic
- Personally administered

Questionire Design Cont. . .

6. Tackle biasedness.
7. Be Selective From the Start.
8. Pilot the Questionnaire.

Step- VII: Data analysis

Data is not information!!!

"Data+ descriptive analysis= informations"

Step- VIII: Hypothesis testing

"informations+ hypothesis testing= inference"

Step- IX: Generalizations & Interpretations

" Real value of research lies in its ability to arrive at certain generalizations"

Step-X: Report preparation

Structure of a thesis/ report

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- Front matter
    - title page
    - declaration
    - acknowledgements
    - table of contents
    - list of tables
    - list of figures
    - abbreviations
- Main matter
    - introduction
    - literature review
    - methods
    - results and discussions
    - Conclusions
- Back matter
    - appendices
    - references
    - list of publications
    - index
```

Productive tools in research

- SPSS- for ' primary analysis'
- R- for 'intelligent' analysis
- Word processors- for stenographic typesetting

- LaTeX for - scientific typesetting
- AI & ML tools for responsive analysis

Questions

End notes

Thanks a lot to organizers for selecting me for this august ocassion.