ISSN : 2278 – 5639
Global Online Electronic International Interdisciplinary Research Journal (GOEIIRJ)
{ Bi-Monthly} Volume-II, Issue-III October 2013

RESEARCH METHODOLOGY. KEY CONCEPTS OF THE SCIENTIFIC METHOD

Dr. V. S. Murkute
Associate Professor,
College of Education, Nashik.

Abstract:

There are several important aspects to research methodology. The present paper explores the research methodology, key concepts of the scientific method. The concepts like Research Problem, Objectives, Hypothesis, Sampling process, Variables, Statistical technique, Choosing the research method, Drawing conclusions, Reliability and Validity of research. There is a relationship between statistical technique, sampling and data collection. This relationship is based on the concept of research. Research is a process for collecting, analyzing and interpreting information to answer questions.

Key terms - Hypothesis, Variables, Statistical technique, Reliability and Validity.

Introduction:

There are several important aspects to research methodology. Steps of scientific method are shaped an hourglass –starting from general questions, narrowing down to focus on one specific aspects, designing research where we can observe and analyze this aspect. At last we conclude and generalize to the real world.

The Objectives of Research :

Research is the systematic process of collecting and analyzing information to increase our understanding of the phenomenon under study. It is the function of the researcher to contribute to the understanding of the phenomenon and communicate the understanding to others. Objectives are the heart of any worthwhile research.

The objective of Research is to find the answers to certain questions through the applications of scientific procedures.

The goal of research process is to produce new knowledge which takes three forms: Exploratory: research which structures and identifies new problems. Constructive: develops solution to a problem. Empirical: Test the feasibility of a solution using empirical evidence.

Research Problem :

Researcher organizes their research by formulating and defining a research problem. This helps them focus the research process so that they can draw conclusions reflecting the real world in the best possible way.

Hypothesis ;

In research, a hypothesis is a suggested explanation of a phenomenon. A hypothesis is a preliminary or tentative explanation or postulate by the researcher of what the researcher consider the outcome of an investigation will be. It indicates the expectations of the researcher regarding certain variables. A hypothesis is the suggested solution to the problem. Problem cannot be directed tested, whereas the hypothesis can be tested and verified.

Mouton (1990) :

Statement postulating a possible relationship between two or more phenomena or variables.

Guy (2003) :

A statement describing a phenomenon or which specifies a relationship between two or more phenomena.

Characteristics of a Hypothesis:

- It should have elucidating power.
- It should strive to furnish an acceptable explanation of the phenomenon.
- It must be verified.
- It must be formulated in simple, understandable terms.
- It should correspond with existing knowledge.

Types of Hypotheses :

Hypotheses can be classified in terms of their derivation (inductive and deductive hypotheses) and in terms of their formulation.

1] Research hypothesis :

It is relationship between variable and indicate the nature of relationship.

2] Null hypothesis :

"You are wrong, there is no relation; disprove me if you can" (Kerlinger, 1973)

Variables :

A variable is something that changes. It changes according to different factors. Some Variables changes easily, like stock –exchange value, while other variables are almost constant,

like name of someone or anything where the value can change. An example of variable is temperature. The temperature varies according to other variable and factors.

Types of Variables :

1] Descriptive variables: Descriptive variables are those that will be reported on, without relating them to anything in particular. Categorical variables result from a selection from categories, such as agree' and disagree'. Nominal and ordinal variables are categorical.

2] Numeric variables : Numeric variables give a number, such as age. Discrete variables are numeric variables that come from a limited set of numbers. They may result from, answering questions such as how many', how often' etc. Continuous variables are numeric variables that take any value, such as weight.

Statistical Techniques :

Business Dictionary.com (2010) has defined statistical methods as "mathematical concepts, formulas models, techniques used in statistical analysis of random data.

In comparison, deterministic methods are used where the data is easily reproducible or its behavior is determined entirely by its initial stage and inputs".

In order to achieve these tasks researchers apply statistical techniques to check if tests and other instrument present valid and reliable measures. A research plan is a detailed description of procedures a researcher uses to investigate a problem or a topic (gay, 2003)

The t-test is one of many statistical significance tests, which compares two supposedly equal sets of data to see if they really are alike or not. The t-test helps the researcher conclude whether a hypothesis is supported or not.

The chi-square test-is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories.

Sample :

Sampling is a process in which a number of individuals are selected for a study in such a way that the larger groups from which these individuals are selected are represented by them. The intent of sampling is to obtain information about a larger population. A population which the researcher aims to investigate and generate results from study is referred as a target population, although the population that is selected that is selected by researcher from a more realistic perspective is known as the accessible population.

Types of sampling :

Simple random sampling, Stratified sampling, Cluster sampling, Systematic sampling.

According to Gay, sample should as large as possible. Gay advised that the larger the sampling most likely it will be more representative of the population, and it will better generalize the results of the study.

Choosing the research method :

The selection of the research method is crucial for what conclusions you can make about a phenomenon. It is also important to choose a research method which is within the limits of what the researcher can do. Time, money, feasibility, ethics and availability to measure the phenomenon correctly are examples of issues constraining the research.

Drawing conclusions :

Drawing conclusion is based on several factors of the research process, not just because the researcher got the expected results. It has to be based on the validity and reliability of the measurement, how good the measurement was to reflect the real world and what more could have affect the results.

Validity and Reliability

Validity refers to what degree the research reflects the given research problem, while Reliability refers to how consistent a set of measurements are.

Types of validity :

- External Validity
- Population Validity
- Ecological Validity
- Internal Validity
- Face Validity
- Construct Validity
- Convergent and Discriminate Validity

Reliability may be defined as "Yielding the same or compatible results in different clinical experiment or statistical trials." Research methodology lacking reliability cannot be trusted. Replication studies are a way to test reliability.

Types of Reliability:

- Test-Retest Reliability
- Internal Consistency Reliability
- Instrument Reliability.

Conclusion :

As briefly demonstrated on this paper, there is relationship between statistical techniques, sampling and data collection. "Research is a process for collecting, analyzing and interpreting information to answer questions."

References :

1. BusinessDictionary.com (2010).Statistical methods http// *www.businessdictionary.com*
2. Experiment –Resource.com (2008).Research Methodology: *http://www.experiment-resource.com*
3. Garrett, H.E. (1981) Statistics *in Psychology and Education* Tenth ed. Bombay, Vakils, Feffer and Simons Ltd.
4. Kumar, R. (2005). *Research methodology*: A step-by-step guide for beginners(2nd ed.)
5. Kulkarni, M.B. (August, 2009) *Statistical Techniques*, YCMOU Nashik.