

14/3/2019

RESEARCH

METHODOLOGY

Lecture #3

Research Process

→ Formulating the Research Problem:

* The main trick or achievement here is to formulate a general topic into specific research problem.

Two important steps:

- ① Through literature review and understanding
- ② Rephrasing to meaningful terms from analytical point of view.

* Literature review can be of two types.

- ① The conceptual: concepts & theories.
- ② Empirical: studies, observations.

* Filter out only ~~that~~ relevant data from irrelevant data.

* ^{Clear} Objectives provides: data to be collected + characteristics of data + relations which are to be explored + choice of techniques + form of final report.

Research Question:- can be phrased ~~and~~ using phrases like. why, what, how, when.

→ Extensive Literature Survey:-

* MS / PhD synopsis or research proposal is submitted to BASR for approval.

* Thorough reading of journal, conference, papers, books etc reports

* One source will lead to another and always study authentic published papers/books/reports.

→ Development of Working Hypothesis:-

* Hypothesis plays important role and should be specific, limited to the research topic, as it has to be tested.

* It indicates type of data required and type of methods for data analysis.

* Overall, we can say that a working hypothesis arise as a result of a-priori thinking about the subject, examination of available data and material, counsel of experts and interested parties.

→ Preparing the research design:

- * Research design is actually a conceptual structure within which research would be conducted.

→ Determining Sample Design:

- * ~~Items~~ All items under consideration in any field of inquiry constitute a universe or population.
- * Sample is collected for a given population.
e.g. selecting 12 of a 200 city's drugstores.
- * Sample $\begin{cases} \rightarrow \text{Probability} \\ \rightarrow \text{Non-Probability} \end{cases}$

→ Probability:

- Random Sampling: sample are selected randomly. e.g. sample of 300 items from universe of 15000 items. Put names/no.s of all 15000 items on paper and conduct a lottery.

- Systematic sampling: In this sampling is to select every 15th name on list, every 10th house on one side of a street ---

- Stratified Sampling: This sampling technique is applied in case there is no homogeneity groups in the given population. So the population is stratified into number of non-overlapping sub-populations or strata and sample items are selected from each stratum. Stratified random sampling...

• Cluster/Area Sampling:

Cluster: involves grouping the population and then selecting the groups or the clusters. e.g. departmental store wishes to sample its credit card holders. Total 15000 customers; could be framed into 100 clusters of 150 cards holders each. Three clusters might then be selected for the sample randomly. This technique is easier and increase efficiency of field work specially in case of personal interviews.

Area: For area sampling we first divide the total area into a number of smaller non-overlapping areas, then no. of these smaller areas is selected for sample randomly.

Non-Probability Sampling:

• Quota Sampling:

• Convenience Sampling: when the sample items are selected deliberately just for ease of access. e.g. researcher wishes to secure data from CNA users, he may select a fix number of patrol stations (providing CNA) and may conduct interview at these stations.
Here results can be biased? Why?

• Judgement Sampling: The researcher's judgement is used for selecting items which he considers as representation of population. e.g. judgement sample of BEE/BCE students at INU might be taken to secure reactions to a new method of teaching i.e. (Outcome based education system). Used in qualitative research.

→ Collecting the Data: through Experiments & Surveys

Experiments: researcher observes some quantitative measurements, statistical value, facts and no. figures.

Surveys:

• Observation: The info. obtained relates to what is currently happening. This method is expensive and provides limited information. Not suitable for large samples.

• Personal interview: The investigator follows a rigid procedure and seeks answers to a set of pre-conceived questions through personal interviews.

• Telephone interview: collecting info. by contacting the respondents through telephone itself. This method is used when survey has to be accomplished in limited time.

• Mailing Questionnaires: Extensively used method in economic and business surveys. Through this the questionnaire is prepared carefully and mailed to the respondents with a request to return after completing the same.

• Through Schedules: Under this method enumerators are appointed and given training. They are provided with schedules containing relevant questions. The enumerators go to respondents and collect the data by filling the schedules.

Here training and sincerity of enumerator matter a lot.

→ Execution of Project: - should be systematic, correct lines & timely.

* surveys should be strictly monitored, and in accordance with pre-defined standards of accuracy.

* list down the non-respondents and consult field experts for help and support.

→ Analysis of Data: done through statistical tools, simulation software or some experimental testing equipment.

→ Hypothesis testing: Chi-square, t-test, f-test. are done to check the significance of test/analysis conducted.

* another way is to compare results with rivals research

→ Generalization & Interpretation.

→ Preparation of Report or thesis writing:

* Thesis layout

* write up should be concise and objective style.

* provide charts, figures, tables and discuss information more clearly.

* Highlight correctly and with confidence your contributions. and also highlight limitations of your research.

⇒ Study Material given on:

'Engineering research project: Methodology'

Discussion !

⇒ Research Questions: "Introduction to Engineering Research". Page 9, 10, 11

Exp 1.5

Exp 1.6

Exp 1.7

Exp 1.8

} Discussion !