A State Level Seminar on Research Methodology: Tools and Techniques Organized by ASM's Institute of Professional Studies with Savitribai Phule Pune University

A State level Seminar on Research Methodology was organised by the institute on 13th and 14th October 2017. The seminar was addressed by various expert from academics and industry. The seminar was attended by faculty member and students from different management institutes in and around Pune. Faculty members and Students of IPS also attended the seminar.

DAY 1 : SESSION 1

Topic: Steps in Research Process

Speaker Name: Dr. Bharat Kasar

Date: -13th Oct, 2017

Time: -10:15 am to 11:30 am

Dr. Bharat Kasar explained that Scientific knowledge is unified, organized and systematic, while ordinary knowledge is a jumble of isolated and disconnected facts. Science applies special means and methods to render knowledge true and exact, but ordinary knowledge rests on observations which are not methodical. But scientific knowledge and ordinary.

Knowledge are not different in kind, but only in degree. Scientific knowledge is more specialized, exact and organized than ordinary knowledge. Research is the process of systematic and in-depth study or search for a solution to a problem or an answer to a question backed by collection, compilation, presentation, analysis and interpretation of relevant details, data and information. It is also a systematic endeavor to discover valuable facts or relationships. Research may involve careful enquiry or experimentation and result in discovery or invention. There cannot be any research which does not increase knowledge which may be useful to different people in different ways. i) Industrial and economic activities have assumed huge dimensions. The size of modern business organizations indicates that managerial and administrative decisions can affect vast quantities of capital and a large number of people.

Trial and error methods are not appreciated, as mistakes can be tremendously costly. Decisions must be quick but accurate and timely and should be objective i.e. based on facts and realities. In this back drop business decisions now a day are mostly influenced by research and research findings. Thus, research helps in quick and objective decisions.

ii) Research, being a fact-finding process, significantly influences business decisions. The business management is interested in choosing that course of action which is most effective in attaining the goals of the organization. Research not only provides facts and figures to support business decisions but also enables the business to choose one which is best.

iii) A considerable number of business problems are now given quantitative treatment with some degree of success with the help of operations research. Research into management problems may result in certain conclusions by means of logical analysis which the decision maker may use for his action or solution.

iv) Research plays a significant role in the identification of a new project, project feasibility and project implementation.

v) Research helps the management to discharge its managerial functions of planning, forecasting, coordinating, motivating, controlling and evaluation effectively.

vi) Research facilitates the process of thinking, analyzing, evaluating and interpreting of the business environment and of various business situations and business alternatives.

vii) Research and Development (R& D) helps discovery and invention. Developing new products or modifying the existing products, discovering new uses, new markets etc., is a continuous process in business.

viii) The role of research in functional areas like production, finance, human resource management, marketing need not be over emphasized. Research not only establishes relationships between different variables in each of these functional areas, but also between these various functional areas.

ix) Research is a must in the production area. Product development, new and better ways of producing goods, invention of new technologies, cost reduction, improving product quality, work simplification, performance improvement, process improvement etc., are some of the prominent areas of research in the production area.

x) The purchase/material department uses research to frame alternative suitable policies regarding where to buy, when to buy, how much to buy, and at what price to buy.

xi) Closely linked with production function is marketing function. Market research and marketing research provide a major part of marketing information which influences the inventory level and production level. Marketing research studies include problems and opportunities in the market, product preference, sales forecasting, advertising effectiveness, product distribution, after sales service etc.,

xii) In the area of financial management, maintaining liquidity, profitability through proper funds management and assets management is essential. Optimum capital mix, matching of funds inflows and outflows, cash flow forecasting, cost control, pricing etc., require some sort of research and analysis. Financial institutions also (banking and non-banking) have found it essential to set up research division for the purpose of collecting and analysing data both for their internal purpose and for making in-depth studies on economic conditions of business and people.

xiii) In the area of human resource management personnel policies have to be guided by research. An individual's motivation to work is associated with his needs and their satisfaction. An effective Human Resource Manager is one who can identify the needs of his work force and formulate personnel policies to satisfy the same so that they can be motivated to contribute their best to the attainment of organizational goals. Job design, job analysis, job assignment, scheduling work breaks etc., have to be based on investigation and analysis.

xiv) Finally, research in business is a must to continuously update its attitudes, approaches, products goals, methods, and machinery in accordance with the changing environment in which it operates.

Steps in the Research Process STEP 1:
Formulate your question STEP 2: Get
background information STEP 3:
Refine your search topic STEP 4:
Consider your resource options STEP
5: Select the appropriate tool STEP 6:
Use the tool
STEP 7: Locate your materials
STEP 8: Analyze your materials
STEP 9: Organize and write
STEP 10: Compose your bibliography

A research proposal is intended to convince others that you have a worthwhile research project and that you have the competence and the work-plan to complete it. Generally, a research proposal should contain all the key elements involved in the research process and include sufficient information for the readers to evaluate the proposed study.

Common Mistakes in Proposal Writing

1. Failure to provide the proper context to frame the research question.
2. Failure to delimit the boundary conditions for your research.
3. Failure to cite landmark studies.
4. Failure to accurately present the theoretical and empirical contributions by other researchers.
5. Failure to stay focused on the research question.

6. Failure to develop a coherent and persuasive argument for the proposed research.

7. Too much detail on minor issues.

8. Too much rambling

9. Too many citation lapses and incorrect references.
10. Too long or too short.
11. Failing to follow the APA style.
12. Slopping writing.
The session was interactive and student gaining knowledge about the research methodology.

DAY 1 : SESSION 2

Topic: Research Design & Hypothesis Testing

Speaker Name: Dr. Santosh Dastane

Date: -13th Oct, 2017

Time: -11:30 am to 1:15 pm

Brief Description

In his Addressal, **Dr. Santosh Dastane** stressed The **research design** refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the **research** problem; it constitutes the blueprint for the collection, measurement, and analysis of data.A good research design should satisfy the following four conditions namely objectivity, reliability, validity and generalization of the findings.

1. Objectivity: It refers to the findings related to the method of data collection and scoring of the responses. The research design should permit the measuring instruments which are fairly objective in which every observer or judge scoring the performance must precisely give the same report. In other words, the objectivity of the procedure may be judged by the degree of agreement between the final scores assigned to different individuals by more than one independent observer. This ensures the objectivity of the collected data which shall be capable of analysis and drawing generalizations.

2. Reliability: Reliability refers to consistency throughout a series of measurements. 3. Validity: Any measuring device or instrument is said to be valid when it measures what it is expected to measure.

4. Generalizability: It means how best the data collected from the samples can be utilized for drawing certain generalizations applicable to a large group from which sample is drawn. He Said that research design is a blueprint of any research study. He explained the following types of research design:

1. Research design for exploratory or formulative studies: In this type of design, a vague problem is selected and understood and is then followed by an exploratory research to find a new hypothesis and then carrying out conclusion research decisions to finally get new ideas. Aims at finding a new hypothesis. Individual surveys, referring to secondary sources of data etc. play an important role in such research designs. Reviewing related literature, following or surveying people having practical experience in the problem related field act as very important and most commonly used methods by an exploratory researcher.

2. Research design for experimental studies – Explains the structure of an experiment. Involve plans for the testing of the causal hypothesis. Decides the number of observations to be taken and

also the order in which experiments are to be carried out. Which randomization method to be used. Which mathematical model to be used for explaining the experiment.

Dr. Santosh Dastane also described hypothesis as an assumed statement with both alternate and null in nature. She explained the following characteristics of hypothesis:

1. Should be empirical statements -- i.e., susceptible to observation. The hypotheses should not be normative.
2. A second desirable attribute of a good hypothesis is generality. It explains a general phenomenon, rather than a single occurrence.
3. A good hypothesis should be plausible - it shouldn't defy logic.
4. A good hypothesis is specific, meaning that the concepts are carefully defined.
5. And finally, a good hypothesis must be testable, and it cannot be a tautology.

A common statistical method is to compare a population to the mean.

For example, you might have come up with a measurable hypothesis that children have a higher IQ if they eat oily fish for a period of time.

Your alternative hypothesis, H1 would be

“Children who eat oily fish for six months will show a higher IQ increase than children who have not.”

Therefore, your null hypothesis, H0 would be

“Children who eat oily fish for six months do not show a higher IQ increase than children who do not.”

In other words, with the experiment design, you will be measuring whether the IQ increase of children fed oily fish will deviate from the mean, assumed to be the normal condition.

H0 = No increase. The children will show no increase in mean intelligence.

From IQ testing of the control group, you find that the control group has a mean IQ of 100 before the experiment and 100 afterwards, or no increase. This is the mean against which the sample group will be tested.

The children fed fish show an increase from 100 to 106. This appears to be an increase, but here is where the statistics enters the hypothesis testing process. You need to test whether the increase is significant, or if experimental error and standard deviation could account for the difference.

Using an appropriate test, the researcher compares the two means, taking into account the increase, the number of data samples and the relative randomization of the groups. A result showing that the researcher can have confidence in the results allows rejection of the null hypothesis.

DAY 1 : SESSION 3

Topic: Measurement of Data, Data Collection

Speaker Name: Dr. Satish Pawar

Date: -13th Oct, 2017

Time: -2:00 pm to 3.45 pm

Brief Description

Dr. Satish Pawar delivered his session on **data analysis** which is a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making. Data analysis has multiple facets and

approaches, encompassing diverse techniques under a variety of names, in different business, science, and social science domains. **Graphical representation is the visual display of data using plots and charts.** It is used in many academic and professional disciplines but most widely so in the fields of mathematics, medicine and the sciences. Graphical representation helps to quantify, sort and present data in a method that is understandable to a large variety of audiences.

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Bivariate analysis is one of the simplest forms of quantitative (statistical) analysis. It involves the analysis of two variables (often denoted as *X*, *Y*), for the purpose of determining the empirical relationship between them. Bivariate analysis can be helpful in testing simple hypotheses of association. Bivariate analysis can help determine to what extent it becomes easier to know and predict a value for one variable (possibly a dependent variable) if we know the value of the other variable (possibly the independent variable) (see also correlation and simple linear regression). Bivariate analysis can be contrasted with univariate analysis in which only one variable is analyzed. Like univariate analysis, bivariate analysis can be descriptive or inferential. It is the analysis of the relationship between the two variables. Bivariate analysis is a simple (two variable) special case of multivariate analysis (where multiple relations between multiple variables are examined simultaneously). Linear regression is the most basic and commonly used predictive analysis. Regression estimates are used to describe data and to explain the relationship between one dependent variable and one or more independent variables. At the center of the regression analysis is the task of fitting a single line through a scatter plot. The simplest form with one dependent and one independent variable is defined by the formula y = c + b*x, where y = estimated dependent, c = constant, b = regression coefficients, and x = independent variable. However linear regression analysis consists of more than just fitting a linear line through a cloud of data points. It consists of 3 stages –

(1) analyzing the correlation and directionality of the data,

(2) estimating the model, i.e., fitting the line, and

(3) evaluating the validity and usefulness of the model. There are 3 major uses for regression analysis – (1) causal analysis, (2) forecasting an effect, (3) trend forecasting.

Other than correlation analysis, which focuses on the strength of the relationship between two or more variables, regression analysis assumes a dependence or causal relationship between one or more independent and one dependent variable. Firstly, it might be used to identify the strength of the effect that the independent variable(s) have on a dependent variable. Typical questions are what is the strength of relationship between dose and effect, sales and marketing spend, age and income. Secondly, it can be used to forecast effects or impacts of changes. That is regression analysis helps us to understand how much will the dependent variable change, when we change one or more independent variables. Typical questions are how much additional Y do I get for one additional unit X. Thirdly, regression analysis predicts trends and future values. The regression analysis can be used to get point estimates. Tests for statistical significance are used to address the question: what is the probability that what we think is a relationship between two variables is really just a chance occurrence? If we selected many samples from the same population, would we still find the same relationship between these two variables in every sample? If we could do a census of the population, would we also find that this relationship exists in the population from which the sample was drawn? Or is our finding due only to random chance? Tests for statistical significance tell us what the probability is that the relationship we think we have found is due only to random chance. They tell us what the probability is that we would be making an error if we assume that we have found that a relationship exists. We can never be completely 100% certain that a relationship exists between two variables. There are too many sources of error to be controlled, for example, sampling error, researcher bias, problems with reliability and validity, simple mistakes, etc. But using probability theory and the normal curve, we can estimate the probability of being wrong, if we assume that our finding a relationship is true. If the probability of being wrong is small, then we say that our observation of the relationship is a statistically significant finding. Statistical significance means that there is a good chance that we are right in finding that a relationship exists between two variables. But statistical significance is not the same as practical significance. We can have a statistically significant finding, but the

implications of that finding may have no practical application. The researcher must always examine both the statistical and the practical significance of any research finding.

DAY 1 : SESSION 4

Topic: Sampling Techniques

Speaker Name: Dr. Meenakshi Duggal & Dr. Sachin Ambekar

Date: -13th Oct, 2017

Time: -4:00 pm to 5:00 pm

Brief Description

In his session **Dr. Sachin Ambekar** said that sampling frame is the source material or device from which a sample is drawn. It is a list of all those within a population who can be sampled, and may include individuals, households or institutions. n the most straightforward cases, such as when dealing with a batch of material from a production run, or using a census, it is possible to

identify and measure every single item in the population and to include any one of them in our sample; this is known as direct element sampling. However, in many other cases this is not possible; either because it is cost-prohibitive (reaching every citizen of a country) or impossible (reaching all humans alive).

Having established the frame, there are a number of ways for organizing it to improve efficiency and effectiveness. It's at this stage that the researcher should decide whether the sample is in fact to be the whole population and would therefore be a census. This list should also facilitate access to the selected sampling units. A frame may also provide additional 'auxiliary information' about its elements; when this information is related to variables or groups of interest, it may be used to improve survey design. While not necessary for simple sampling, a sampling frame used for more advanced sample techniques, such as stratified sampling, may contain additional information (such as demographic information).For instance, an electoral register might include name and sex; this information can be used to ensure that a sample taken from that frame covers all demographic categories of interest.

(Sometimes the auxiliary information is less explicit; for instance, a telephone number may provide some information about location.)

A probability sample is a sample in which every unit in the population has a chance (greater than zero) of being selected in the sample, and this probability can be accurately determined. The combination of these traits makes it possible to produce unbiased estimates of population totals, by weighting sampled units according to their probability of selection.

Example: We want to estimate the total income of adults living in a given street. We visit each household in that street, identify all adults living there, and randomly select one adult from each household. (For example, we can allocate each person a random number, generated from a uniform distribution between 0 and 1, and select the person with the highest number in each household). We then interview the selected person and find their income.

Non-probability sampling

Non-probability sampling is any sampling method where some elements of the population have *no* chance of selection (these are sometimes referred to as 'out of coverage'/'undercovered'),

or where the probability of selection can't be accurately determined. It involves the selection of elements based on assumptions regarding the population of interest, which forms the criteria for selection. Hence, because the selection of elements is nonrandom, non-probability sampling does not allow the estimation of sampling errors. These conditions give rise to exclusion bias, placing limits on how much information a sample can provide about the population. Information about the relationship between sample and population is limited, making it difficult to extrapolate from the sample to the population.

Sampling methods

Within any of the types of frames identified above, a variety of sampling methods can be employed, individually or in combination. Factors commonly influencing the choice between these designs include:

- Nature and quality of the frame
- Availability of auxiliary information about units on the frame
- Accuracy requirements, and the need to measure accuracy
- Whether detailed analysis of the sample is expected
- Cost/operational concerns

Simple random sampling

In a simple random sample (SRS) of a given size, all such subsets of the frame are given an equal probability. Each element of the frame thus has an equal probability of selection: the frame is not subdivided or partitioned.

Systematic sampling

Systematic sampling (also known as interval sampling) relies on arranging the study population according to some ordering scheme and then selecting elements at regular intervals through that ordered list. Systematic sampling involves a random start and then proceeds with the selection of every *k*th element from then onwards.

Stratified sampling

When the population embraces a number of distinct categories, the frame can be organized by these categories into separate "strata." Each stratum is then sampled as an independent sub-population, out of which individual elements can be randomly selected.

He explained about sampling very well and classes were interactive and knowledgeable.

Dr. Meenakshi Duggal continued the session and involved the students in different management activities. Students participated proactively in the activity and the session ended with good note.

DAY 2 : SESSION 1

Topic: Data Analysis

Speaker Name: Dr. Sharad Joshi

Date: -14th Oct, 2017

Time: -10:15 am to 1:00 pm

Brief Description

Dr. Sharad Joshi Delivered his session on **data analysis Data analysis**, also known as analysis of data or data analytics, is a process of inspecting, cleansing, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, in different business, science, and social science domains.

The process of data analysis

Analysis refers to breaking a whole into its separate components for individual examination. Data analysis is a process for obtaining raw data and converting it into information useful for decision-making by users. Data is collected and analyzed to answer questions, test hypotheses or disprove theories. There are several phases that can be distinguished, described below. The phases are iterative, in that feedback from later phases may result in additional work in earlier phases.

Data requirements

The data is necessary as inputs to the analysis are specified based upon the requirements of those directing the analysis or customers who will use the finished product of the analysis. The general type of entity upon which the data will be collected is referred to as an experimental unit (e.g., a person or population of people). Specific variables regarding a population (e.g., age and income) may be specified and obtained. Data may be numerical or categorical.

Data collection

Data is collected from a variety of sources. The requirements may be communicated by analysts to custodians of the data, such as information technology personnel within an organization. The data may also be collected from sensors in the environment, such as traffic cameras, satellites, recording devices, etc. It may also be obtained through interviews, downloads from online sources, or reading documentation.

Data processing

Data initially obtained must be processed or organized for analysis. For instance, these may involve placing data into rows and columns in a table format (i.e., structured data) for further analysis, such as within a spreadsheet or statistical software.

Data cleaning

Once processed and organized, the data may be incomplete, contain duplicates, or contain errors. The need for data cleaning will arise from problems in the way that data is entered and stored. Data cleaning is the process of preventing and correcting these errors. Common tasks include record matching, identifying inaccuracy of data, overall quality of existing data, duplication, and column segmentation. Such data problems can also be identified through a variety of analytical techniques.

Exploratory data analysis

Once the data is cleaned, it can be analyzed. Analysts may apply a variety of techniques referred to as exploratory data analysis to begin understanding the messages contained in the data. The process of exploration may result in additional data cleaning or additional requests for data, so these activities may be iterative in nature.

Dr. Sharad Joshi explained data analysis very well and session was very useful and even questionnaire of Café coffee day was been distributed among the students.

DAY 2 : SESSION 2

Topic: Report Writing

Speaker Name: Dr. S.R. Mali

Date: -14th Oct, 2017

Time: -2:15 pm to 4:00 pm

Brief Description

Dr. S.R.Mali explained about his tips for report writing through which students can make their SIP report a well structured report. He described that after collecting and analyzing the data, the researcher has to accomplish the task of drawing inferences followed by report writing. This has to be done very carefully, otherwise misleading conclusions may be drawn and the whole purpose of doing research may get vitiated. It is only through interpretation that the researcher

can expose relations and processes that underlie his findings. In case of hypotheses testing studies, if hypotheses are tested and upheld several times, the researcher may arrive at generalizations. But in case the researcher had no hypothesis to start with, he would try to explain his findings on the basis of some theory. This may at times result in new questions, leading to further researches. All this analytical information and consequential inference(s) may well be communicated, preferably through research report, to the consumers of research results who may be either an individual or a group of individuals or some public/private organization. Mostly, research work is presented in a written form. The practical utility of research study depends heavily on the way it is presented to those who are expected to act on the basis of research findings. Research report is a written document containing key aspects of research project. Research report is a medium to communicate research work with relevant people. It is also a good source of preservation of research work for the future reference. Many times, research findings are not followed because of improper presentation. Preparation of research report is not an easy task. It is an art. It requires a good deal of knowledge, imagination, experience, and expertise. It demands a considerable time and money. Research report is the systematic, articulate, and orderly presentation of research work in a written form. The main features of a report are described below to provide a general guide. These should be used in conjunction with the instructions or guidelines provided by your department.

Title Page

This should briefly but explicitly describe the purpose of the report (if this is not obvious from the title of the work). Other details you may include could be your name, the date and for whom the report is written.

Summary (Abstract)

The summary should briefly describe the content of the report. It should cover the aims of the report, what was found and what, if any, action is called for. Aim for about 1/2 a page in length and avoid detail or discussion; just outline the main points.

Contents (Table of Contents)

The contents page should list the different chapters and/or headings together with the page numbers. Your contents page should be presented in such a way that the reader can quickly scan the list of headings and locate a particular part of the report. You may want to number chapter headings and subheadings in addition to providing page references. Whatever numbering system you use, be sure that it is clear and consistent throughout.

Introduction

The introduction sets the scene for the main body of the report. The aims and objectives of the report should be explained in detail. Any problems or limitations in the scope of the report should be identified, and a description of research methods, the parameters of the research and any necessary background history should be included.

Methods

Information under this heading may include: a list of equipment used; explanations of procedures followed; relevant information on materials used, including sources of materials and details of any necessary preparation; reference to any problems encountered and subsequent changes in procedure.

Results

This section should include a summary of the results of the investigation or experiment together with any necessary diagrams, graphs or tables of gathered data that support your results. Present your results in a logical order without comment.

Discussion

The main body of the report is where you discuss your material. The facts and evidence you have gathered should be analyzed and discussed with specific reference to the problem or issue. If your discussion section is lengthy you might divide it into section headings. Your points should be grouped and arranged in an order that is logical and easy to follow. Use headings and

subheadings to create a clear structure for your material. Use bullet points to present a series of points in an easy-to-follow list. As with the whole report, all sources used should be acknowledged and correctly referenced.

Conclusion

In the conclusion you should show the overall significance of what has been covered. You may want to remind the reader of the most important points that have been made in the report or highlight what you consider to be the most central issues or findings. However, no new material should be introduced in the conclusion.

Appendices

Under this heading you should include all the supporting information you have used that is not published. This might include tables, graphs, questionnaires, surveys or transcripts.

Bibliography

Your bibliography should list, in alphabetical order by author, all published sources referred to in your report. There are different styles of using references and bibliographies.

Acknowledgements

Where appropriate you may wish to acknowledge the assistance of particular organizations or individuals who provided information, advice or help.

Glossary of Technical Terms

It is useful to provide an alphabetical list of technical terms with a brief, clear description of each term. You can also include in this section explanations of the acronyms, abbreviations or standard units used in your report.

The session conducted by Mr. T. Srinivas would help the students throughout their career.

SUDHAKAR JANARDHAN BOKEPHODE

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